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THE MAGAZINE FOR INFORMATION EXECUTIVES

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VOLUME THREE NUMBER SEVEN

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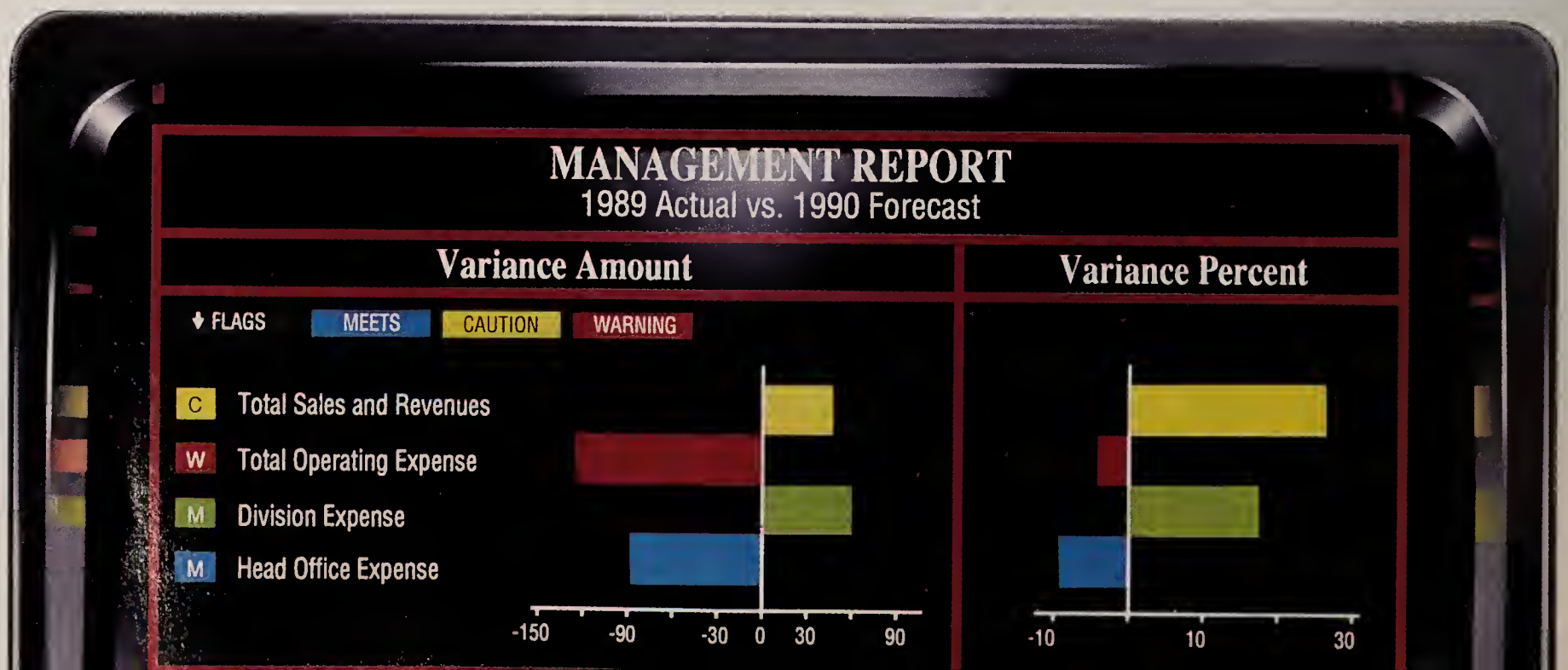
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* "Decision Support and Executive Information Systems: Markets and Trends," International Data Corporation, November 1988.





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MOTOROLA

**THE
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"I DIDN'T CODEX D



**KNOW
ID THAT!"**

Now that information executives finally seem to have gotten used to the CIO acronym, *BusinessWeek* has declared that they and their title may be headed for the dust heap. In a recent article entitled, "CIO is Starting to Stand For 'Career Is Over,'" *BusinessWeek* reported that CIOs were becoming highly dispensable. The article presented a gloomy scenario of CIO failure, but halfway through the piece reversed that position, stating instead that within five years every major firm would have a CIO who is a peer to the CEO. Really

BW, make up your mind—or maybe just report what's really happening in the CIO ranks instead of ballyhooing the two extremes.

The CIO position is a relative neophyte in the executive hierarchy. Tom Friel, managing partner at headhunter Heidrick & Struggles Inc., who was quoted at length in the *BusinessWeek* article, told *CIO* that it takes a new executive position about 10 years to establish itself in the organization. He pointed out that the CIO position is in a state of transition. He

eventually sees the CIO as a line executive (not as a peer to the CEO).

The CIO position has emerged at a time when the business environment is caught in a competitive vise. Initially the CIO was expected to create solutions that would deliver competitive advantage and shore up sagging profits. But the CIO cannot work in a vacuum, but rather needs the input and support of top executives. Many of these executives have not been involved in IT to any great degree, and their expectations of CIOs may have been unrealistic.

So the reported turnover among the CIO ranks could be a reflection of the general business environment, where the rules of the game are changing at an unprecedented speed. This turnover rate is not an accurate indicator of CIO success or failure. How many sales executives are shown the door when they fail to deliver bottom-line results? Does this mean the end of the sales executive? Hardly.

Heavy-gun consulting companies are spending a lot of time studying the CIO phenomenon. Would they be wasting big-time dollars on examining an extinct species? *CIO* magazine has reported many of these studies and done a few of our own. For example, our "CIO 100" showed that between 1988 and 1989, the number of CIOs reporting to the CEO doubled (26 percent versus 13 percent). As advocates of information executives and of the role of IT in contributing to business health, *CIO* thinks it will be a few more years before the role of the CIO settles into the organization. We'll continue to report on that progress rather than deliver premature death notices.

Marcia Blumenthal



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Technology Transfer

A strategy of corporatewide decentralization and user empowerment enabled Sprague Technologies to transform its IS function from primitive to progressive

BY BOB HEISE

In 1987, I was charged with leading Sprague Technologies' IS organization from a highly centralized management function to one that today is completely decentralized. Sprague, a worldwide manufacturer of electronic components now based in Stamford, Conn., had recently been spun off from parent organization The Penn Central Corp. of Cincinnati as a public company. About 40 of Sprague's 150 IS employees were in corporate IS, and the rest were scattered throughout the company's 20 manufacturing facilities. In addition, of 8,000 worldwide employees, the company had only 150 or so non-IS computer users. Our goal was to reduce overall IS

costs by shrinking corporate IS and making the individual units autonomous. Staff sizes would be kept down by sharing certain aspects of the company's IS expertise among the business units.

I accepted the challenge, recognizing that expanding control of computer data from the 300 user employees we had then to the 1,600 users we have today could have created as many problems as opportunities for Sprague—chief among them downtime and loss of data. But if anything about our transition surprised me, it was that it all went so smoothly. This is particularly significant when you consider that a sophisticated IS organization is a relatively new phenomenon at Sprague.

Back in the '60s, the role of IS at Sprague was pretty much restricted to calculating payroll. When I joined the company in the early '70s, we began using the computer for manufacturing and costing applications—as did the rest of the industry. By the time I was named senior IS executive in 1984, the situation had changed dramatically and computer technology was being used for everything from manufacturing to order-entry to marketing. But all data was still controlled from a central, corporate mainframe and distributed to the plants. The control function was still with corporate IS.

About five years ago, we began to realize that Sprague needed to create a more dynamic IS organization. We needed a structure that would give our business units greater ability to purchase competitively, control costs and market internationally. Above all, we needed the flexibility to respond quickly and efficiently to customers. It made sense, then, that when Sprague was spun off from Penn Central in 1987, decentralization was adopted as part of our IS charter.



ILLUSTRATION BY FRED LYNCH



April 1990

"The issue is simple. You can have great information, but it is useless if you can't get it to the people who need it. Wherever they are. Immediately."

Lawrence Willis
Coopers & Lybrand

Dear Executive:

Networking is nothing more nor less than the ability to move information from point A to point B. Obviously, this is essential for business success. But as of now, few organizations are properly networked, which presents a great risk to their bottom line.

Many executives have been unpleasantly surprised to learn that they must wait until tomorrow to get a report from another part of the company because of the complexities involved in linking one set of machines to another.

The good news is that the networks designed to bridge those gaps are finally growing up. In recent years, they have become more sophisticated, affordable, reliable and essential.

According to a recent CIO survey, 60% of all businesses plan to purchase networking equipment within the next year. Sales of the equipment are expected to soar to over \$18 billion by 1992.

Why the emphasis on networking? Two common business developments have fueled the networking boom: the expansion of organizations into new geographic and demographic markets and an increase in global competition where the efficient management of information is of paramount importance.

CIO Magazine and AMR International are teaming up to present our second CIO EXECUTIVE FORUM to help you explore the real business issues for the '90s. For detailed information on our upcoming conference, "Computer & Communications Strategies & Global Competition," to be held May 20-22 in Dallas, please call Lori Cardarelli (508) 935-4631, or Diane Martin (508) 935-4274. They'll rush you complete information plus a registration package via return mail.

Sincerely,

Joseph L. Levy
President and Publisher

Coming in CIO

Telecom Special

Next month *CIO* explores the fascinating, often baffling world of telecommunications. This special issue includes a roundtable discussion among CIOs, vendors and consultants; features on the ins and outs of implementing a sound telecommunications policy; and revealing profiles of companies that are leading the way into the brave new world of global communications.

The Quest for Quality

Many companies today are concerned with the issue of quality. But what part does IT play in this pursuit? *CIO* takes a look.

Outsourcing

Although we stop short of calling it all the rage, letting third parties take on the burden—and worry—of a variety of information-processing chores is clearly an idea that is spreading. *CIO* looks at whether outsourcing is a blessing or merely a contagion.

Update on ISDN

What's new on the integrated services digital network since we last examined it almost a year ago? Has ISDN fulfilled its many promises? *CIO* takes a second look.

Often, the fear of change is what hampers decentralization. And when anxiety starts at the top with senior executives, it can set a destructive course throughout an entire company. One reason I believe Sprague's transition was so effective is that management was already united in its commitment to a decentralized environment.

I supported the concept from the outset when I accepted my current position in 1984. I had rejoined Sprague after a three-year hiatus as director of computing services at PepsiCo. I knew the emphasis of my mandate at Sprague was on decentralizing IS, and Pepsi's decentralized IS milieu gave me a good foundation for understanding such a culture. My experience at both Pepsi and Sprague convinced me that for Sprague to remain competitive, each business unit had to be independently effective. And I knew that that effectiveness would to some degree depend on the appropriateness of each division's information systems. In a fully decentralized environment, one division's growth and increased demands for information services need not affect another's operations. Rather, those costs could be localized, with each division maintaining only the systems it might need.

In keeping with the philosophy of decentralization, my first step was not to complete a corporate IS needs assessment, but to obtain one from each of our business units. With the help of our accounting firm and in conjunction with plant general managers, my staff and I put together project plans for each plant. Those reports formed the foundation of our IS business plan.

I served as liaison, if you will, between the units. And to a manager, everyone was very willing and cooperative. Again, I feel that's because Sprague senior management was so positive about the switch to decentralization. It was a top priority at corporate planning meetings, for example. Our CEO made sure senior management both at corporate headquarters and at the business units understood the issues at hand. This gave them the credibility to get people to listen to the issues, thus help-

The fear of change is what hampers decentralization. When anxiety starts at the top, it can set a destructive course throughout an entire company. One reason our transition was so effective is that management was already united in its commitment to a decentralized environment.

ing to move the project forward.

Ironically, one of the things in our favor was that the electronics industry has traditionally been five or six years behind other industries in our computer applications. Our employees were able to read about information technology in newspapers and magazines before facing it on the job—so when it was installed, the environment was quite welcoming.

Also, many of our employees' children use computers in school, and so the technology had already come into their homes. Clearly, the climate was right for wider involvement with IS among our employees, and they accepted this new path. But some fear of the unknown remained.

Our approach to training helped to remove this apprehension. To start the process of decentralizing applications to the business units, in 1984 and 1985 each unit created a project team comprised of both IS people and computer users. Each team was responsible, with help from corporate IS, for developing its own training models and schedules.

We contracted trainers and alerted employees via a newsletter about training sessions and schedules. Over a period of six months, the trainers

provided both individual and group instruction to some 300 IS employees and end users two evenings a week. Participation in the training was voluntary. Employees recognized that the degree to which they became computer proficient had a direct bearing on both Sprague's market share and their own futures.

In tandem with computer education, we focused our early efforts on helping both IS people and senior management at the business units to understand what it would mean to be responsible for an entire IS function. In most cases their previous experience had been limited to just a few applications. That's very different from maintaining a data center.

This was the only aspect of my task which gave me pause. I asked myself: Could IS personnel with limited experience pull off running their own IS functions in 18 months—after more than 15 years of centralization? Thankfully, my fears eventually proved groundless.

Our vendors—Hewlett-Packard, Digital and IBM—did a very good job of getting people prepared. For instance, they conducted on-site seminars that addressed such issues as "how to run a computer operation" and "the cost-benefit analysis of installing support systems in Sprague factories."

After this initial acclimation period, the next phase of IS decentralization involved setting up both a training area and a schedule with our human-resources organization—first at the site of our central computer and later in some of the plants as well.

Training efforts are ongoing. In some instances, we have sent people off-site for special training—in the area of manufacturing resources planning (MRP), for example. Other employees attend IS seminars and workshops run by electronics industry associations.

We also encourage peer training. When employees complete advanced courses in various IS applications, they then teach those functions to two or three of their colleagues. We promote this by creating project teams in the work groups. Such peer-to-peer training is both cost-efficient and extremely effective.

Of course, as a growing number of employees become computer literate—and as IS expands in scope and sophistication—we're adapting our training programs accordingly. We offer fewer "fundamentals" programs now. Increasingly, our people are learning to apply new technologies to meet specific needs. Training now, for example, might deal with how to use electronic document-interchange procedures to accept customer orders or how to operate in an MRP environment.

Although training has played an important role in the decentralization process, it hasn't been Sprague's only strategy. We also gave ourselves adequate time between implementation at the various business units so we could react to problems when they occurred. Case in point: When we implemented an order-management module to decentralize that function, we didn't put it up in four locations in one weekend. Instead we spaced them 10 to 12 workdays apart. That way, when we had difficulty installing the first one, we were able to regroup to clear up the problem. The second installation then proceeded more smoothly, and the third and fourth were relatively error-free.

Another key strategy was to purchase packaged software systems and modify them to create the specialized reporting that each business unit required. The alternative, writing a program, demands a substantial investment of time, money and personnel—which further bogs down the already resource-intensive experience of decentralization.

We also limited ourselves to three types of hardware and five software programs, all of which intercommunicate well. That made installation and maintenance very easy. At the same time, it enables our business units to select the systems that best meet their business requirements. Sprague has always believed that giving people choices is important, and that's even truer during a period of internal change.

Finally, throughout the transition we paid a great deal of attention to communication. We never allowed se-

nior management—at corporate headquarters or within the business units—to wonder what we were doing and how we were doing it. We ran quarterly management update meet-

Throughout the transition we paid a great deal of attention to communication, never allowing senior management—at corporate headquarters or within the business units—to wonder what we were doing and how we were doing it.

ings and, in fact, still produce IS status reports for all worldwide activity. We also have divisional management review meetings three to four times a year.

In the same vein, I kept our IS managers informed. They, in turn, made sure the general managers—and ultimately, all employees—were aware of each step Sprague took toward IS decentralization.

My job has changed since Sprague decentralized, and I'm the only IS person at corporate headquarters these days. I no longer walk into a data center 40 feet from my office to see how things are going; now I have to get in a car or on a plane to keep our IS organization and plant general managers knitted together. Of course, electronic mail is a big help.

The structure of Sprague's IS staff has been altered. Half of our corporate IS people transferred to business units. Others had difficulty accepting relocation from a metropolitan environment to what they perceived as remote areas and left

the company. (Fortunately, our planning process allowed us time to find qualified people for each facility.) And the 100 IS employees on Sprague's payroll today report to general managers at the various business units.

My role has evolved to that of a planning liaison. Much of my current efforts are directed at developing and implementing IS project plans in the Far East and Europe and implementing a worldwide distribution system. I'm also evaluating the pros and cons of outsourcing a major data center in Mansfield, Mass., to a facilities-management organization.

I enjoy it. And I'm convinced that similar scenarios are inevitable for IS executives in any mid-size to large corporation that hasn't already decentralized. The bottom line is that there's a lot of pressure today on data centers to reduce costs and at the same time increase productivity. Business is fast realizing that decentralization is one means to accomplish both ends; for Sprague, it's been quite effective.

To date we've realized savings of about \$3 million, and we project that those savings will double by 1992. Furthermore, it's measurably faster for our plants to access the data they need to maintain a customer-driven production schedule. We have more people who work smarter. They're working harder, too.

This isn't where our story ends, however.

Sprague considers the past several years to be simply one phase in our evolution toward a computer-literate environment. By 1992 we expect to have 2,000 employees using computers in their jobs on a daily basis. As technology advances, our IS organization will continue to do so, too. For example, voice-recognition equipment that eliminates the need for manual keyboarding is on the horizon, and we've already begun looking at ways to integrate it.

You might say that releasing the power and potential of the computer to all our people is Sprague's ultimate objective. □

Bob Heise is vice president of MIS at Sprague Technologies Inc., based in Stamford, Conn.

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Prime Movers

A recent survey shows that CEOs are ready to play a bigger role in IT decision-making—a shift that CIOs had better prepare for

BY RAYMOND J. LANE

A dramatic shift is taking place in the way information technology is managed. A recent survey indicates that top management will become the catalyst for IT change and the advocate for new IT investment decisions in the 1990s. This will have significant repercussions for CIOs.

Every three years, Booz Allen & Hamilton conducts a survey on CEO/CIO satisfaction with information technology. In our 1990 survey, we interviewed more than 100 CEOs, top line managers and CIOs from some of America's largest companies.

The findings show that the traditional attitudes of CEOs and top line managers toward information technology are changing. They will become the leaders in generating demand for IT; furthermore, they will take an active role in devising approaches to satisfy that demand.

Many CIOs will find managing IS in the '90s akin to drinking from a fire hose. Although the past 10 years has been a period of dramatic technological change, the relationship between senior management and IS has remained remarkably stable. Information executives have long advocated the benefits of increased systems investments; senior management has lagged in its acceptance.

But the world is about to turn upside-down. The irony is that many CIOs will not get the credit they deserve for pushing, prodding, encouraging and leading senior management to the point where this "inversion" occurs.

The survey confirms that CEOs and other senior executives are more fully recognizing the benefits IT can deliver. Sixty-two percent of CEOs think systems are sup-

porting business strategies. Due to improved functionality and responsiveness, systems performance is ranked by 86 percent of respondents as much better than it was three years ago. Another 79 percent say that systems investments are delivering their money's worth. The number of companies using objective methods to evaluate systems investments has increased by more than 50 percent over our 1987 survey.

Moreover, pressures related to costs, internal systems inadequacies and changes in the marketplace will force top management to call for increased IS capabilities in the '90s.

What can a systems organization do to prepare for this onslaught?

■ Initiate a major updating, refurbishing and restructuring of software

programs. Renewal doesn't mean settling for incremental gains, but rather stretching the organization to rethink its work flows, programming methodologies and application purposes. And it results in dramatic reductions in maintenance costs.

■ Validate resource priorities to ensure that IT funds and efforts are spent on highest-value activities.

Institute new software-engineering methods. This will free up resources for systems development, increase productivity and lower costs.

■ Adopt a policy of hiring the best people and reward achievement to retain the talent of the organization. Staff should be both technically competent and able to understand the business.

■ Abandon the "not-invented-here" mentality. Consider new outsourcing opportunities and calling in outside experts when appropriate or necessary. Push responsibility further down in the organization to provide the freedom to change embedded roles, rules and processes.

■ The IS organization must develop a keen awareness of the major issues facing the company and learn to leverage its strengths (or develop new ones) to help it thrive in an increasingly competitive marketplace.

These elements can help CIOs and their organizations maximize systems returns and prepare for the increased systems demands of senior executives. Properly prepared, the CIO can steal a personal victory from this coming blitz. [CIO]

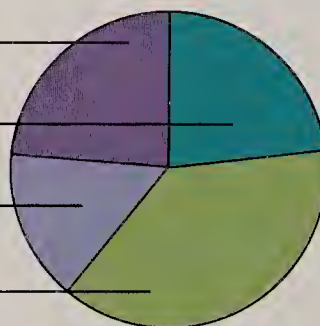
Raymond J. Lane is a senior vice president with Booz Allen & Hamilton Inc. in Dallas. He leads the firm's Information Systems Group.

Why Are Systems Better Today?

CEO/CIO perceptions of MIS still differ

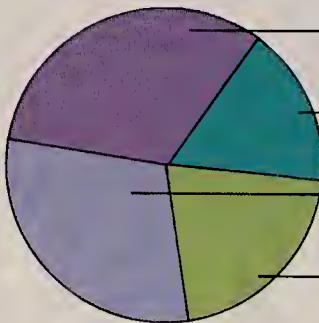
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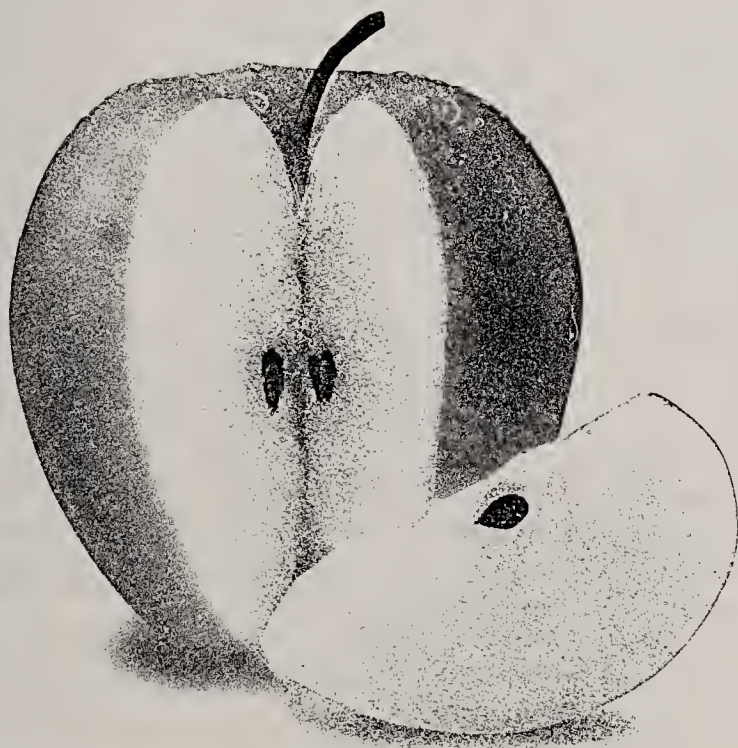


CIO

Better Understanding of Business Needs **33%**
Increased Responsiveness to End-Users **16%**
Improved Development **30%**
Improved Systems Functionality **21%**



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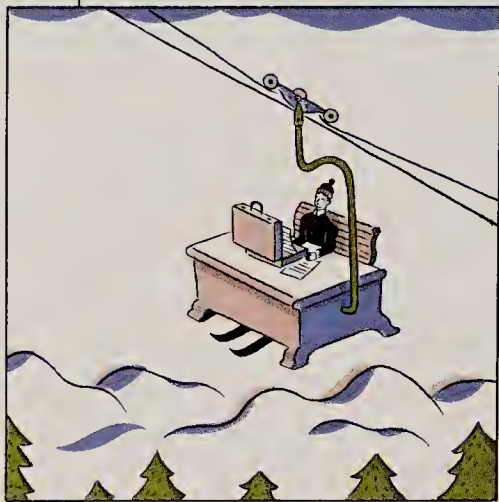
TRENDLINES

PRODUCTIVITY

MAKING HAY WHILE THE SNOW FLIES

If getting beeped on a chair lift or receiving faxes between schusses sounds as enticing as skiing in knee-deep Alpine powder, then there is a resort for you.

Ski Windham, nestled in the Catskill Mountains of Windham, N.Y., has recently opened the Commerce Club, a sort of "office-on-the-



slopes" where busy people can partake in some pre- or après-skiing work.

Located in the base lodge adjacent to the lifts, the Commerce Club is equipped with six semi-private work areas, word processors, fax machines, credit-card phones, copiers, secretarial services, meeting rooms and an on-the-slope beeper/paging system that allows skiers to be notified when that important package arrives. Use of the facility costs \$10 a day or \$100 for the season and includes daily newspapers and coffee. Other services, such as typing, collating, Federal Express and lunch service are available at an additional cost.

The Commerce Club was opened after many patrons asked to use Ski Windham's office facilities. There has been a steady if not overwhelming response—between four and six people using the

facility at any one time, according to Diana Bagnall, Ski Windham's marketing director. Most people use the facilities to catch up on work between runs, but one writer on deadline spent a week at the club while her husband romped on the slopes.

So if you're one of those executives who gets separation anxiety at just the thought of a vacation, grab your Rossignols, Vuarnets and day-glopants, and goskiing. ■

ALLIANCES

ONE PLUS ONE EQUALS . . . ?

Information executives believe they are getting better solutions when computer and communications vendors join forces, but they worry that the products of these strategic alliances often end up carrying higher price tags than they should, according to a survey from the Business Research Group (BRG) in Newton, Mass.

The BRG study was based on interviews with users at 200 medium and large compa-

nies in four industries: finance, retail, manufacturing and transportation/utilities. It was designed to determine the value of what Burstyn called "synergistic alliances"—agreements between computer builders and communications companies to produce combined products while otherwise remaining completely independent of each other.

In general, the products of the computer-communications alliances have no direct competitors; systems integrators might be able to assemble something for clients, but there was until now no basic off-the-shelf hardware option. BRG found that the product areas best suited for alliances were voice communications, local area networks and bridge and network management products.

While the alliances may be well thought of for their technological advantages, Burstyn said, customers apparently feel that "... vendors need to pay more attention to upkeep and support." It wasn't always clear, he said, who should be called for maintenance and repair, or who would be revising and updating the product.

Among the partnerships surveyed by Burstyn as part of the study were Digital Equipment Corp.'s deals with Northern Telecom, AT&T and Seimans; Hewlett-Packard's arrangement with Northern Telecom; Unisys's agreement with AT&T; and DCA Corp.'s agreements with both AT&T and Northern Telecom. "They usually look for a partner . . . that is not directly competitive, has a specific

expertise, has a demonstrable commitment to standards, and has a corporatewide commitment to alliances," Burstyn said.

The vendor-partners believed their joint products to be well accepted by customers and generic enough to be useful to a broad base. They also thought the joint products had made possible sales that otherwise would never have come their way. "They all felt they were successful," Burstyn said. "Even if they hadn't had monetary success yet, they felt they were on the road . . ."

A MAG FOR THE MOBILE

Lleave it to the devoutly motorized West Coast. A Woodland Hills, Calif., outfit called CurtCo Publishing has launched *Mobile Office*, a magazine dedicated to "businesspeople on the move." *MO* is a smorgasbord of writing about the staple products of roadwork: laptop computers, cellular phones, modems and faxes. The premiere issue includes an article on a uniquely roadish aspect of computer security—anti-theft strategies. Along with product news are a couple of "Profiles in Mobility," personality pieces on software maven Philippe Kahn and magazine publisher Wayne Green, and their stories of work beyond the desk.

The same issue features a column by Editor Michael Meresman that photographically salutes the fictional pioneer of cellular communications, Maxwell Smart. CurtCo can be reached at 818 593-3900. They're probably out idling at a spotlight somewhere, waiting for you to call. ■

REUNITED

Businessland and Compaq Computer Corp. have gotten back together after a year-long divorce. The schism was costly for both, with Compaq giving up market share to IBM and Businessland losing a product line that had accounted for 15 percent of its total sales volume. Analysts told the *Wall Street Journal* that IBM and the smaller PC manufacturers are the most likely to be hurt by the rapprochement. ■

TRENDLINES

DOES IT COME WITH A SHERPA?

Talk about your field systems. . . . Hermès, the French retail chain (and "chain" may be too grubby a word), is known mostly for pricey scarves and leather goods. But the New York outlet has been showing off a portable branch office in a steamer trunk for the discerning road warrior who happens to have a spare \$200K to blow.



The trunk, made of high-tech carbon fiber trimmed in brass and leather, is about the size of a smallish outhouse, but it packs a payload of chic technology. Inside it are a fax machine, a laptop PC, a VCR, a television, a stereo, a fold-out desk, an attache case (sort of like having a little boat hung from the davits of a big boat), and room for assorted *papiers* and *cravates*.

According to a Hermès spokesperson, the trunk is a one-of-a-kind novelty dreamed up by company Chairman Jean-Louis Dumas-Hermès. Although it was originally intended to travel from store to store, the trunk's daunting size has kept it moored in New York. Soon, however, it will be off to Japan (Hermès's second-largest market after the U.S.), where someone might actually buy it. Given the steady progress of miniaturization and cellularization, this would be a mysterious purchase. And for \$200,000 it should have pop-out wheels and one of those little pull-straps. ■

BRINGING HOME THE BACON

Judging from a spate of recent news articles, the compensation levels of CIOs is a never-ending source of fascination. According to yet another survey, CIOs earn an average annual salary of \$130,000. This statistic was part of the findings of an extensive study of CIOs and top management published by United Research Inc. and the BUSINESS WEEK Newsletter for Information Executives.

Of 202 CIOs polled by Louis Harris & Associates, 35 percent earn \$100,000 or less, 26 percent earn between \$100,101 and \$150,000, and 26 percent earn more than \$150,000. (The remaining 13 percent refused

to answer the question.) Moreover, 81 percent of the CIOs responding to the survey indicated that their organizations have a performance bonus or profit-sharing program for senior officers in which they are eligible to participate.

The survey, which included responses from 100 chief executives, also revealed that both top executives and CIOs consider improved quality—including

the better use of technology, greater operational efficiency and improved products and services—to be the major opportunity for corporations in all industries for this decade. ■



SIMULATION SOFTWARE

EXERCISING YOUR JUDGMENT

Michèle Meagher figured she had heard it all. As sales director for Wisdom Simulators Inc., a software company in Cambridge, Mass., she was quite familiar with the employee-relations war stories that were used to compile the company's Judgment Exerciser simulations for management training.

But astonished she has been by two things she has learned in the course of making sales calls with the products. One revelation to Meagher was the pervasiveness of violence in the workplace. The other was the depth of ignorance concerning—and in some cases even a blatant disregard for—matters of equal-employment opportunity that were expressed by some corporate managers she called on.

The matter of workplace

violence is one of the 10 themes covered by "Hold Your Fire," a simulation game that allows managers to practice their coping strategies in stressful situations—like firing an incompetent employee or someone suspected of stealing or a repeated rule breaker, or cooling destructive competition among rivals.

Meagher initially believed the scenario on violence would be of least interest, but instead found that "over 50 percent of the customers I visited said, 'I've had something like that happen to me.' It hit home." Among the types of incidents described to Meagher: coworkers attempting to stab each other with scissors, car windshields being broken, managers being choked or jumped from behind.

Wisdom Simulators' other game in the series is called "Bite Your Tongue" and is designed to examine common job-interview pitfalls for the interviewer, like how to establish an applicant's legitimate qualifications without asking discriminatory or intrusive questions. It has a more straightforward subject area than "Hold Your Fire," and for the most part it has fairly clear-cut right and wrong answers to the situations it presents.

One problem Meagher has discovered with the game is that some potential users, such as the manager of a nationwide company that she pitched to recently, don't believe that the rules apply to them. "The gentleman said, 'I have no problems with EEOC [Equal Employment Opportunity Commission] issues. My work force is 95 percent white and 75 percent male.' " ■

TRENDLINES

RETAIL IT AWARD

Digital Equipment Corp. of Maynard, Mass., and *Chain Store Age Executive*, a New York-based monthly magazine of the retail industry, will cosponsor an annual award recognizing excellence in retail IT use.



The award, to be known as the RITA (for Retail Innovation Technology Award), is open

to a wide spectrum of retail enterprises, including department, supermarket, discount and specialty stores as well as catalog retailers.

A seven-member panel will judge entrants' systems on the basis of their uniqueness, quantifiable impact, productivity enhancement, cost effectiveness, integration with existing technology and amenability to future growth. One winner and two runner-up organizations will be chosen, and—since no award should be without its commemorative *objet d'art*—the winner will receive a Baccarat crystal obelisk.

Entries for the 1990 awards are due no later than May 15 and should be sent to RITA, *Chain Store Age Executive*, 425 Park Ave., New York, N.Y. 10022. ■

EDUCATION

SYS, BOOM, BAUD! BYTE, TEAM, BYTE!

AT&T Computer Systems is trying to bring computing out of the back room and boost the image of computer-science majors in the process. Concerned about a growing shortage of software professionals and the widening gap between software and hardware productivity, AT&T, working with the Association for Computing Machinery (ACM), sponsored an international programming contest for college students in February, at which it gave away \$25,000 in scholarships as well as computers. The 14th annual ACM Scholastic Programming Contest was held in Washington and attracted teams of students from 24 universities in the United States and Europe and on the Pacific Rim. These finalists were chosen from 12 regional contests in which 1,800 students representing 354 colleges and universities competed last fall.

"Software threatens to become the Achilles heel of the Information Age," said Gordon Bridge, president of AT&T Computer Systems. Projected needs for programmers and systems analysts by the year 2000 run as high as 2.25 million, but the number of students enrolling in the field lags behind those projections, according to Bridge. "Our challenge is to ensure that sufficient numbers of computer professionals are available to meet industry's needs and to foster increased

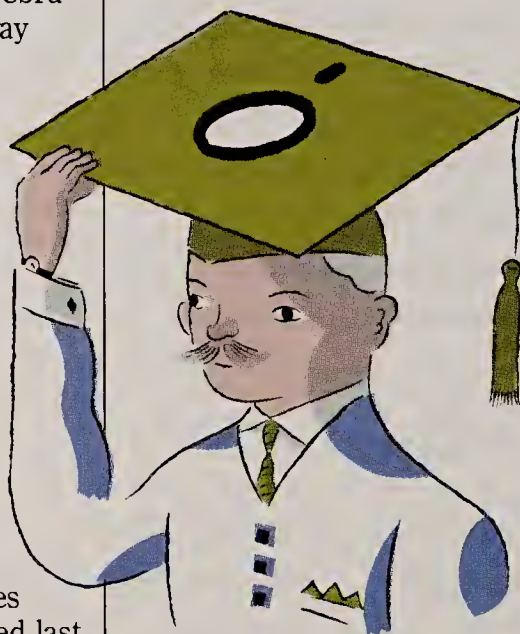
A CIO FOR THE VA

Edward G. (Ted) Lewis has been named assistant secretary for information resources management in the Cabinet-level Veterans Administration. In his new role, Lewis oversees one of the largest information systems in the country. The VA's technology infrastructure supports a wide range of services and facilities, including 172 medical centers, 233 outpatient clinics, 119 nursing-home units and 58 regional offices responsible for administering \$15 billion in veterans' benefits annually.

Lewis, who reports directly to VA Secretary Edward Derwinski, should have the clout to carry out the mandate to provide policy direction and coordination for the 240,000-employee bureaucracy. His more-than-20 years of active U.S. Marine Corps duty won't hurt much either. ■

software productivity throughout the computing community," he said.

"The academic and business communities must work together to meet these chal-



lenges . . .," said contest director William B. Poucher, a computer science professor at Baylor University in Waco, Texas. "Activities such as this contest recognize and reward excellence in the next generation of computer professionals, holding these participants up as role models for others."

Participants in this year's contest included Harvard University; the University of Wisconsin, Madison; Eindhoven Technical University and Leiden University, both of The

Netherlands; University of Southwestern Louisiana; Duke University; and Virginia Tech. The University of Maryland and Stanford University were runners up, while first prize went to the University of Otago, New Zealand. "These young men and women represent the competitive spirit and creative genius of the next generation that will propel the Information Age into the 21st century," Poucher said.

Yes, but do they have a football team? ■

CORRECTION

The byline on February's Human Factors column, "Privacy and IT Use," listed only one of its two co-authors. Along with F. Warren McFarlan, H. Jeff Smith, a doctoral student at the Harvard Business School, should have been given credit for writing the piece. *CIO* regrets the omission.

The column also mistakenly reported that an unnamed credit-card company's database marketing application had come under "legal scrutiny." According to Smith, the company came under consumer scrutiny, but was not subject to a legal investigation. ■

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- Jack Hancock, CIO, Pacific Bell
- Chuck McCaig, CIO, Mutual Benefit Life
- John Nagata, Assistant Superintendent Information Technology, Los Angeles Unified School District
- Joe Nash, CIO, Cadbury Schweppes
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CASSETTE 3

"THE IMPACT OF TECHNOLOGY ON PEOPLE"

- Mitchell Fromstein, Chairman & CEO, Manpower, Inc.

CASSETTE 4

"HOW FAST IS TECHNOLOGY MOVING FORWARD?"

- Andrew Grove, Ph.D., Chairman & CEO Intel

CASSETTE 5

"STRATEGIC ALLIANCES FOR BUSINESS DEVELOPMENT"

- Henry Pfendt, Director Information Technology Systems, Eastman Kodak

CASSETTE 6 CEO/CIO Partnership Panel Discussion:

"ACHIEVING SUSTAINABLE COMPETITIVE ADVANTAGE THROUGH INFORMATION TECHNOLOGY"

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- Glenn Miller, Vice President Corporate Strategy, Businessland
- Morris Taradalsky, V.P. Customer Services & Info. Technology, Apple Computer, Inc.

"INFORMATION MANAGEMENT AT APPLE COMPUTER"

- Morris Taradalsky, V.P. Customer Services & Info. Technology, Apple Computer, Inc.

CASSETTE 7

"THE YEAR AHEAD FOR THE ECONOMY, FOR BUSINESS"

- Malcolm S. Forbes, Jr., President, Forbes Magazine

"THE ROI OF SYSTEMS INTEGRATION"

- Charles Feld, Vice President Information Systems, Frito-Lay

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"MANAGING POLITICAL ACTIVITIES IN REAL TIME"

- Robert Teeter, Republican Pollster and Head Bush Transition Team

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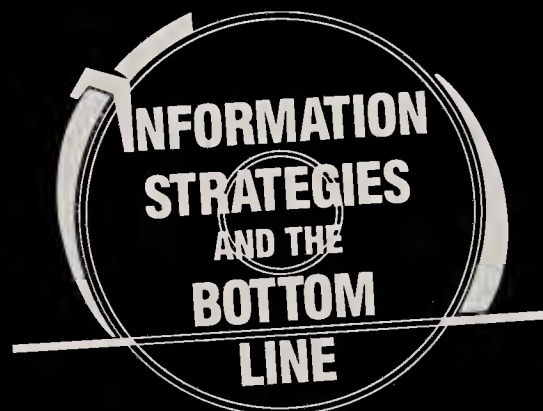
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he San Francisco earthquake of 1989 provided the first real-life test of the efficacy of commercial disaster-recovery services in a widespread disaster. The participants came out smiling [see related story, Page 22], their success attesting to the usefulness of such facilities as business-resumption centers and hot sites (off-the-premises facilities that have all the necessary equipment and

operating systems to run a company's entire IS operations. Such facilities are often shared by a number of clients and run on a first-come, first-served basis).

GIMME SHELTER

But the methods that saw San Franciscans through the earthquake have already been usurped by a new generation of disaster-recovery tools that play the hare to the hot sites' tortoise. Electronic vaulting, for instance, sends backup data off-site electronically in real time. Electronic journaling also saves remotely the data necessary to reconstruct or update a system, but it does not perform the updates. Database shadowing is the same as journaling, except that someone on the receiving end inputs the data pieces into the database—not real time, but close. These new tools can get a business up and running again in less time than it currently takes to collect the backup tapes.

Third-party disaster-recovery firms offer a variety of techniques to keep their data-dependent customers computing

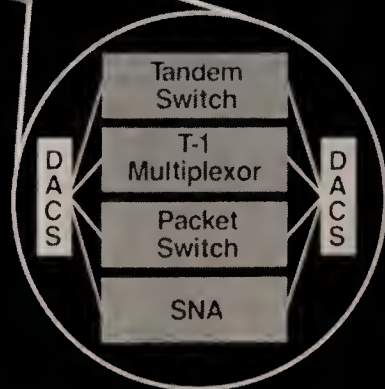
While not every business needs the lightning-quick response that is now within reach, some are feeling pressured to try to attain it. For instance, Uncle Sam has convinced the banking community that time is of the essence. "The Federal Reserve has been alerting us to the need to respond in a more timely

BY KATHLEEN MELYMUKA

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fashion," said Bridget Anne Hampden, vice president of wholesale information risk management at Manufacturers Hanover Corp. in New York. And when the Fed isn't pushing, the competition is. "We want to have that competitive advantage," Hampden said.

Along with speed, commercial disaster-recovery providers offer services that cater to the needs of users, not technicians. Office space, networks, PCs, telecommunications services and toll-free numbers are now as common in hot sites as are mainframes.

Indeed, now that applications have attained "mission-critical" status, business management has begun to take control of disaster recovery—

Indeed, business management has begun to take control of disaster recovery, once an IS domain.

once an IS domain. Even the terminology reflects this: "Business continuity" has supplanted "disaster recovery" in the planning lexicon, according to Chuck Perkins, director of business continuity planning at Coopers & Lybrand in Baltimore. "You're not in business to run computers," Perkins explained; "you run computers to be in business."

As computers have become more intertwined with busi-

Shook Up and Running

Despite the earthquake, Charles Schwab & Co. didn't spill a drop of data

When the earthquake hit San Francisco last fall, Charles Schwab & Co. Inc. was among eight clients of Comdisco Disaster Recovery Services Inc. to declare disasters. The Schwab team recently discussed the planning and execution of its disaster response.

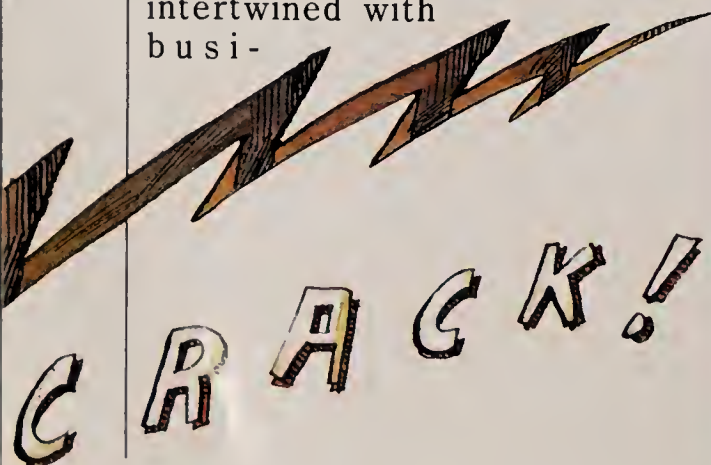
"The company started a contingency planning process several years ago," said Keith Headman, director of corporate security. "We selected people from the business side and the systems side to put together a plan to cover the necessary



SCHWAB STAFF were online at the hot site hours after the quake.

requirements for business and systems resumption." Schwab contracted with Comdisco, headquartered in Rosemont, Ill., not only for computer hot sites but for alternate work space for key people in the business units as well.

Because of the impossibility of predicting the conditions of an earthquake, the team realized they had to make a plan that could be adapted to any situation. It was a good thing they did. As part of the planning effort, the team asked regional emergency services what they could depend on in case of an earthquake. "Their projections turned out to be very different from



what actually happened," recalled Marck Shipley, director of emergency contingency planning. "They told us not to expect use of the airport for three days; we got people out the first night. They said the Bay Bridge would be open; it was closed. They said other bridges would be closed, and they were open."

The earthquake left Schwab's San Francisco headquarters intact, but it blew the power out. As planned, the system switched smoothly to generator power, but the generator overloaded and crashed. "We didn't have systems," said Sheri Anderson, senior vice president of production and systems services. "We got the generator up quickly [and] were in the process of recovering, but we didn't know if data would be usable. It made sense to go into parallel mode" at the out-of-state hot site.

Schwab was able to transport staff to the hot site that night. They had the base system in place and ready to load databases by 5 a.m.—a mere 12 hours after the quake. By that time, however, the original system in San Francisco was back on line. "It turned out we were in-

sent from San Francisco throughout the period to keep the alternate system current should it be needed.

Meanwhile, another Schwab building in San Francisco had been damaged. "We hooked into the system in the San Francisco office," explained Jeff Lyons, administrator of emergency contingency planning. The staff there moved to the local alternate site for two days "so they had office space and terminals."

"Telephone service was sporadically interrupted, but we had some service throughout," Anderson noted. "We rerouted a large number of specialized business lines. We were wonderfully served by our telecommunications department who were able, with AT&T reps, to reroute critical lines."

Although the Schwab plan worked quite smoothly, lessons were learned. "Reality is very different from testing," said Shipley. "You can't expect people to react to the plan as rehearsed. We had phones, and our people could use the phones to check on their families. If they couldn't have called home, people might have reacted differently. It was very important that people were willing to do what was necessary to keep the business going."

Shipley cited vendor support as another crucial ingredient in having the recovery go smoothly. "Make sure your vendors know your plans and can interface with them," he said.

It's also vital that the planning process be business-driven "with active business participation," said Shipley. "It's business resumption, not data-center resumption. You have to look at each part and know which are critical."

Most important, cautioned Anderson, "whatever you plan, you need to practice. The drills we did on the system side and the user side really paid off. It's not enough to write it down; you have to do it."

—K. Melymuka

ness, the disaster threshold has become lower. A problem needn't reach the fire-and-brimstone level to knock a business for a loop. According to Richard B. Zane, president of the North American Division of Comdisco Disaster Recovery Services Inc. of Rosemont, Ill. (one of the largest commercial providers of disaster-recovery services), a "disaster"

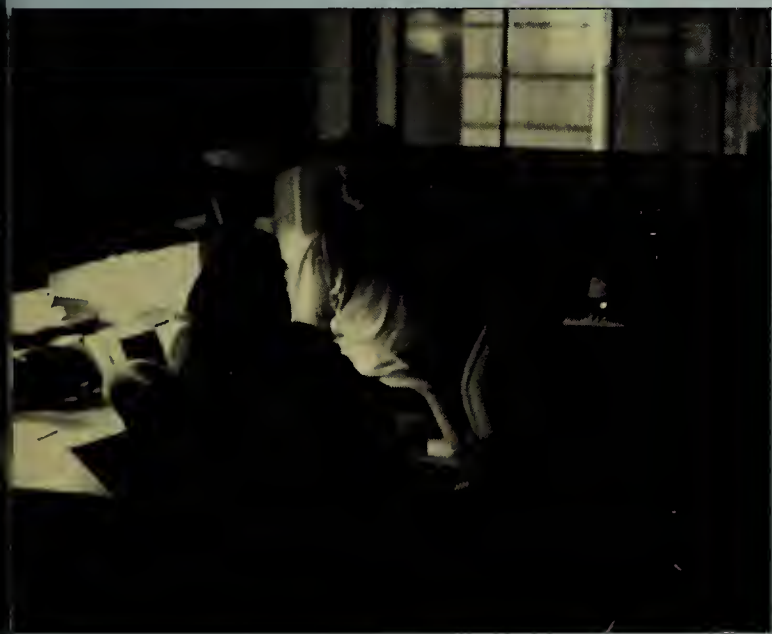
*"You're not in
business to run
computers; you run
computers to be in
business."*

—Chuck Perkins

can be precipitated by any number of things. "It can be [the result of] a transformer problem," he said. "I know of one declared disaster that was related to a bomb scare. There can be hardware upgrade problems [that cause a system to crash], human problems such as union strikes that interrupt access to the center. There can be telecommunications problems such as the Hinsdale, Ill., switching-office fire of 1988. Today the general manager understands that a lot of things can affect the business."

And a lot of new developments can affect the disasters. Robert J. Miano, president of Comdisco Computing Services Corp., a separate entity under the Comdisco umbrella, offers the kinds of tools that have changed disaster recovery into business continuity. "We've come a long way," he said. "Ten years ago, disaster recovery itself was a challenge. Data-center people didn't have a lot of confidence that you could recover. Today most people are confident that you can move into a vendor environment and run. Book one is closed."

Now, Miano said, there's a new generation of questions: How long



credibly lucky," Anderson said. "We were incredibly intact. All our IBM equipment functioned correctly; there was no data loss."

The system and staff at the hot site remained ready to roll in case of aftershocks. Updated tapes were

does it take you to restore? What shape is the data in when you come up?

If a bank sends backup data off-site daily, he explained, a disaster at 3 p.m. would wipe out a whole day's debits and credits. "And it's not just banks," he said. "Just-in-time manufacturing, inventory control in grocery stores, warehouses where everything is stored by computer—if the computer goes down, it's all lost."

Miano's unit addresses these issues. "We used to say, 'What applications do you need backed up?' Now we ask, 'Do you need to be up in 10 hours, six hours, two hours? Must the data be current as of yesterday, this morning, this minute?'"

When you talk about minutes, you talk about electronic vaulting. Prudential Bache Securities in New York installed one of the country's first electronic vaults last summer. "In the event of a disaster, we needed something that would enable us to do a highly reliable recovery and be certain we would have all data up to the time [the disruption] occurred," said Jim Bigham, vice president for the information systems and telecommunications services division. "This system is the best way to assure that."

An electronic vault is an off-site mass-storage system linked to the computer center by fiber-optic cable for instant transmission of backup data. Pioneering the use of the technology didn't bother Bigham. "Many people in charge of business recovery tend not to be technical," he said. "We differ from the norm. We recognized the business implications and the technical feasibility of electronic vaulting three or four years ago when the hardware first became available."

"Electronic vaulting enables us to get critical backup data off-site immediately instead of waiting to physically move it," he explained. "It eliminates the shipping, handling and misplacing of tapes and assures that the data is immediately available in a safe place."

The more organizations

depend on electronic data, the more crucial such services will be, Bigham said. "Five years ago you could go back to the input sheets and reconstruct. With real-time operations, you no longer have that paper trail."

The Prudential Bache design is better than the old paper trail. It calls

Until costs come down, it is generally believed, electronic vaulting will be beyond the reach of most potential users.

for electronic backup of critical online data every two to five minutes, keeping backup information seconds behind real time. Furthermore, the electronic data flows both ways. "An advantage of the vault [over conventional tape backup] is that I can reference [the data] too," Bigham pointed out.

The vault is located at the Comdisco

disaster-recovery facility that Prudential Bache would use in case of a disaster. This arrangement cuts a number of steps—and a lot of time and uncertainty—from the recovery process. "Were we to declare a disaster and go over there, through the use of some programs we've written, we'd be able to access the [storage] silo and use it to restore data and reconstruct the environment without the risk and delay of tape movement. It cuts out a lot of steps. It's very, very fast."

It's also very much on the drawing boards in R&D circles. "We're doing research on image vaulting," said Kenneth R. Adams, chairman and CEO of SunGard Recovery Services, another large vendor of commercial disaster-recovery services, based in Wayne, Pa.

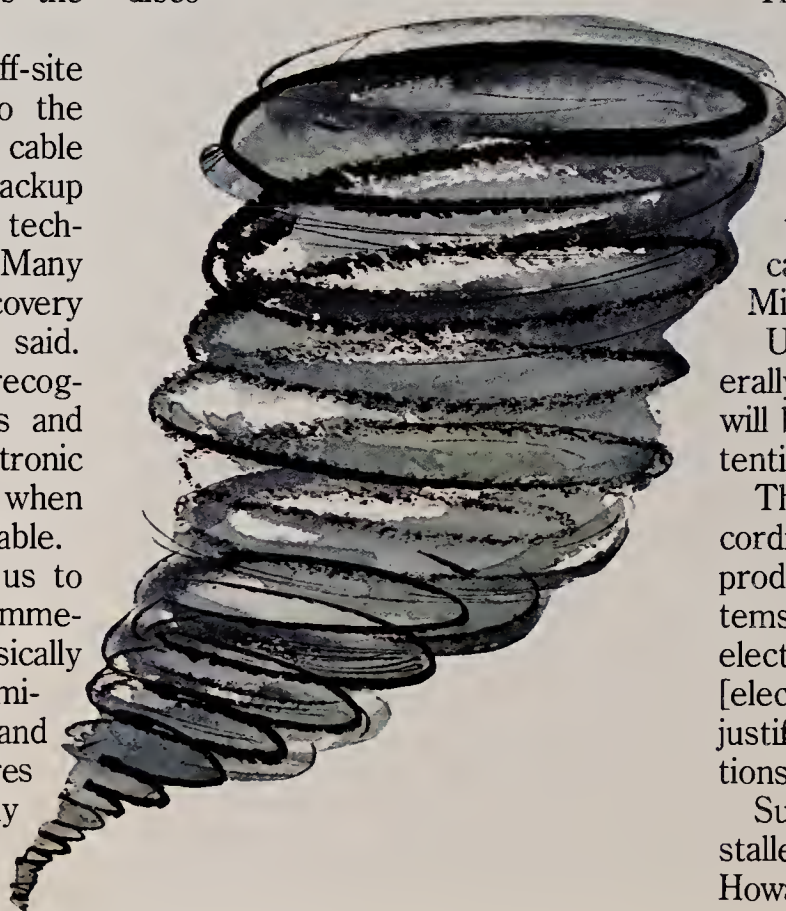
Image vaulting is the electronic transmission and storage of image files. "Many insurance companies are looking at the storage of forms—including handwriting and pictures—things that would normally be in a file cabinet," said Adams. "Electronic image vaulting is taking an instrument that would have to be signed and storing the actual image electronically. It takes a tremendous volume of data to store an image."

There's also less-esoteric work to be done in vaulting, principally related to getting its cost down. In disaster-recovery circles, electronic vaulting is generally considered an idea whose time has not yet come—"because, frankly," said Comdisco's Miano, "it's very expensive."

Until costs come down, it is generally believed, electronic vaulting will be beyond the reach of most potential users.

That's not necessarily true, according to Art Rancis, director of product marketing for Masstor Systems Corp. of New York, a maker of electronic vaults. "We've packaged [electronic vaulting systems] by cost-justifying them for present applications."

Such a package was recently installed at Boston University, where Howard Miller, assistant vice presi-



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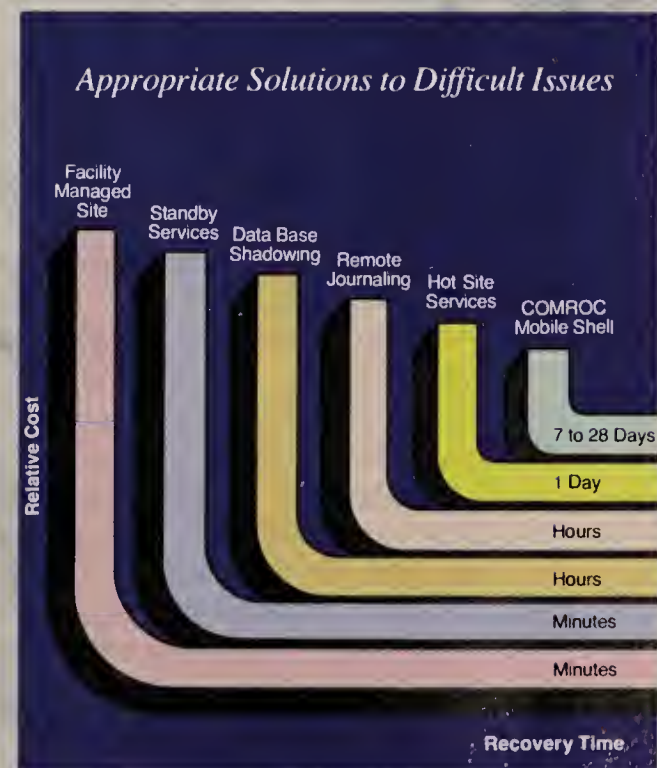
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dent for university information systems, was able to cost-justify electronic vaulting as part of a project to automate his data center. The disaster-recovery aspect was secondary. "I have put into place an electronic vault to provide contingencies for backing up the system," said Miller. "We installed a mass-storage device with the capacity to eliminate tapes. A second device is a mile away, connected by extended fiber-optic links. That's our backup site."

Miller cost-justified the system over a three-year period through the elimination of operating personnel, media purchases, tape drives, storage units, off-site storage, transport, tape-management systems, techni-

**"We used to say,
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yesterday, this
morning, this
minute?'"**

—Robert J. Miano

cal-support personnel for tape-management systems, personnel recovering data from broken and lost tapes and other costs associated with handling tape.

"In our computer center, 25 percent of all labor was associated with handling tapes," he said. "It's an immensely error-prone medium. One in eight of our problems has been associated with tape. You think of tape as a low-cost medium; electronic storage is less costly."

Another tool to close the window of risk when dealing in electronic data is remote journaling. As transactions take place, images of each updated record are transmitted to a remote site. In case of a disaster, the records can be applied to the latest backup of the database to bring it up to date.

That may not be enough for some clients. "Remote journaling attacks the problem of data integrity," said Miano, "but you have a pile of records and the batch-transferred database. Then you have to roll forward [re-enter the data]—take both and put them together. It could take five hours."

The solution: database shadowing. Instead of just capturing transactions, you update the database as you go along. That gets rid of the roll-forward time. Manufacturers Han-

over is currently involved in one of the most ambitious plans ever to use such tools to diminish risk. "The Federal Reserve has been putting the banking community on alert that they must have a process in place to minimize any disaster in funds transfer," said Hampden. "If one large player [in the banking community] is taken out [by a disaster], there could be a dangerous ripple effect on the banking economy."

As a result of this potentially devastating eventuality, "the Fed has moved from a goal of being able to recover by 1 a.m. of the day after a disaster to four to six hours after [it happens]. It's a goal, not yet a requirement, but it's coming."

"We have a long-standing relationship with Comdisco," Hampden said, "but this [project] is above and beyond [the bank's standard hot-site ar-

Putting the Up Back in Backup

.....
A vendor of
videoconference services
is offering disaster
recovery as an offshoot

Customers of Contel ASC in Rockville, Md., needn't worry if the earth moves as long as the heavens remain intact. Contel offers satellite communications to keep networks up when phone lines go down.

"Our solution is a full bypass of terrestrial networks," said Larry Wolter, product manager for data messenger networks at Contel. "There's no need for a phone line to be operational to send data from one site to another."

Contel uses customer-premise earth stations (satellite dishes), and a clear-channel, or SCPC (single-channel-per-carrier), system to "lay a pipe in the sky" from the earth station to the satellite to the other earth station, said Wolter. The only cable is from the client's building to the earth station, usually about 100 feet.

Using the satellite system, customers can transport data between remote sites anywhere in the United States. In a disaster, remote sites can communicate with each other, or with a hot site, regardless of the condition of telephone lines.

The price of Contel's service is competitive with terrestrial lines, according to Wolter. "Our specialty is channel-management services," he said. "In a terrestrial network, if you have five remote sites connected to a central site, you need five lines. With channel-management services, you can have one line with five channels. So you only pay for one pipe."

You can only use one channel at a time, but in a disaster that should

range ment]."

Manufacturers Hanover is putting in place a plan to remotely log funds transfers at its Comdisco hot site. The data will be applied to the backup system about every half hour, so there will be little or no lag between systems.

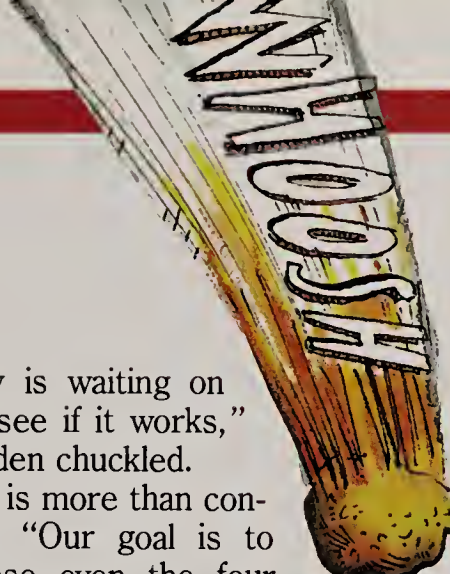
"Our [backup] operating system will be up and spinning at all times, which will save us about three hours," Hampden explained. "With the journaling and shadowing of transactions and forward recoveries, we'll just have to start up the system. That should cut from 12 to 18 hours [off the recovery time.] If we were to take a hit, we could recover at Comdisco within four hours."

The system should be in place in the first quarter of this year. Interest is high within Manufacturers Hanover and elsewhere. "The banking com-

munity is waiting on us to see if it works," Hampden chuckled.

She is more than confident. "Our goal is to decrease even the four-hour recovery," she said. "We think we can do it in two."

The innovation at Manufacturers Hanover and Prudential Bache is not typical. Commercial vendors such as Comdisco and SunGard—the industry leaders—have barely begun to tap the potential client base, even



"I tell people to think of [the cost] as an insurance premium. How much of a headache am I willing to deal with? That's my deductible. Raising my deductible will lower my premium. It's not necessarily beneficial to duplicate the entire system."

—Chuck Perkins

with more conventional services. SunGard's Adams estimates his client base at 800 to 900 companies; Comdisco's Zane claims 1,400 (the two firms are growing at 25 percent and 40 percent annual rates, respectively).

Adams sees opportunities abroad, particularly involving satellite technology. "We're looking at extended satellite communication for disaster recovery in other countries," he said. "Communication links are, for the most part, less sophisticated in foreign countries, and there are fewer standards, so satellite will be the common link."

Zane, too, sees plenty of room to grow. "A large number of potential subscribers have not stepped up to the issue," he said. "Only about 18 percent of large IBM data centers use an alternate site."

That is not to say that the others are unprotected. Depending on an organization's needs, there are less-drastic measures available in the event of a disaster, according to Coopers & Lybrand's Perkins. "Some people back up their computer, but not their networks. You can use dial-up lines in some cases, and there are other alternatives."

Some companies may have internal solutions, some have reciprocal agreements with other divisions or other non-competitive companies, and some can survive without computers while they recover. Others, however, are gambling.

"I tell people to think of [the cost] as an insurance premium," said Perkins. "How much of a headache am I willing to deal with? That's my deductible. Raising my deductible will lower my premium. It's not necessarily beneficial to duplicate the entire system."

In a disaster, he said, many companies can squeak by without computers. "Look at the criticality of function versus the criticality of automation of the function," he cautioned. "Payroll is critical, but it usually doesn't need to be on a computer."

"The object is to bring your requirements down to a level that allows you to survive. It's a business decision: Here's the risk, here's the impact."

Zane said that as potential clients realize that commercial disaster-recovery services can be had for less than 2 percent of overall IS costs, more companies will take the commercial route. "It is a bottom-line expense, and it won't return anything," he acknowledged, "but this is as important as any other kind of insurance. This isn't a discretionary item any more." ☐

Kathleen Melymuka is a freelance writer based in Duxbury, Mass.

be enough, said Wolter. "Generally the sites are geographically dispersed, so the probability of more than one going down [simultaneously] is small."

Satellite service has several potential uses, from videoconferencing to management of end-of-the-month overflow data traffic. In fact, disaster recovery is an offshoot of Contel's main business, videoconferencing.

"If a customer bought videoconferencing, they also bought disaster recovery," said Wolter. Once the pipe is installed, it can be used for any purpose.

Contel customers can purchase a network controller and handle their own satellite communications with a PC-based console, or they can pay a monthly "reservation fee" for service on demand and an hourly charge when the service is used. In both cases, cost depends on transmission speeds and the number of pipes required, plus an initial outlay of about \$60,000 to install an earth station.

—K. Melymuka



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Jack Cooper wouldn't think of embarking on any type of information-technology project without having calculated how much money he thinks it will make for his company. And don't try telling Cooper, who is president of CSX Technology in Jacksonville, Fla., a subsidiary of transportation giant CSX Corp., that some projects are too strategic for a hard cost/benefit analysis. "You can only survive so long on strategic shirt tails," he snapped. "I can't believe that anyone would think—as scarce as resources and profits are—that they can argue over a period of years for sustained MIS funding when they can't pinpoint the value of their systems. You absolutely have to assign a dollar value."

Cooper's adamance resonates with conventional wisdom. After all, he's talking about a part of the organiza-

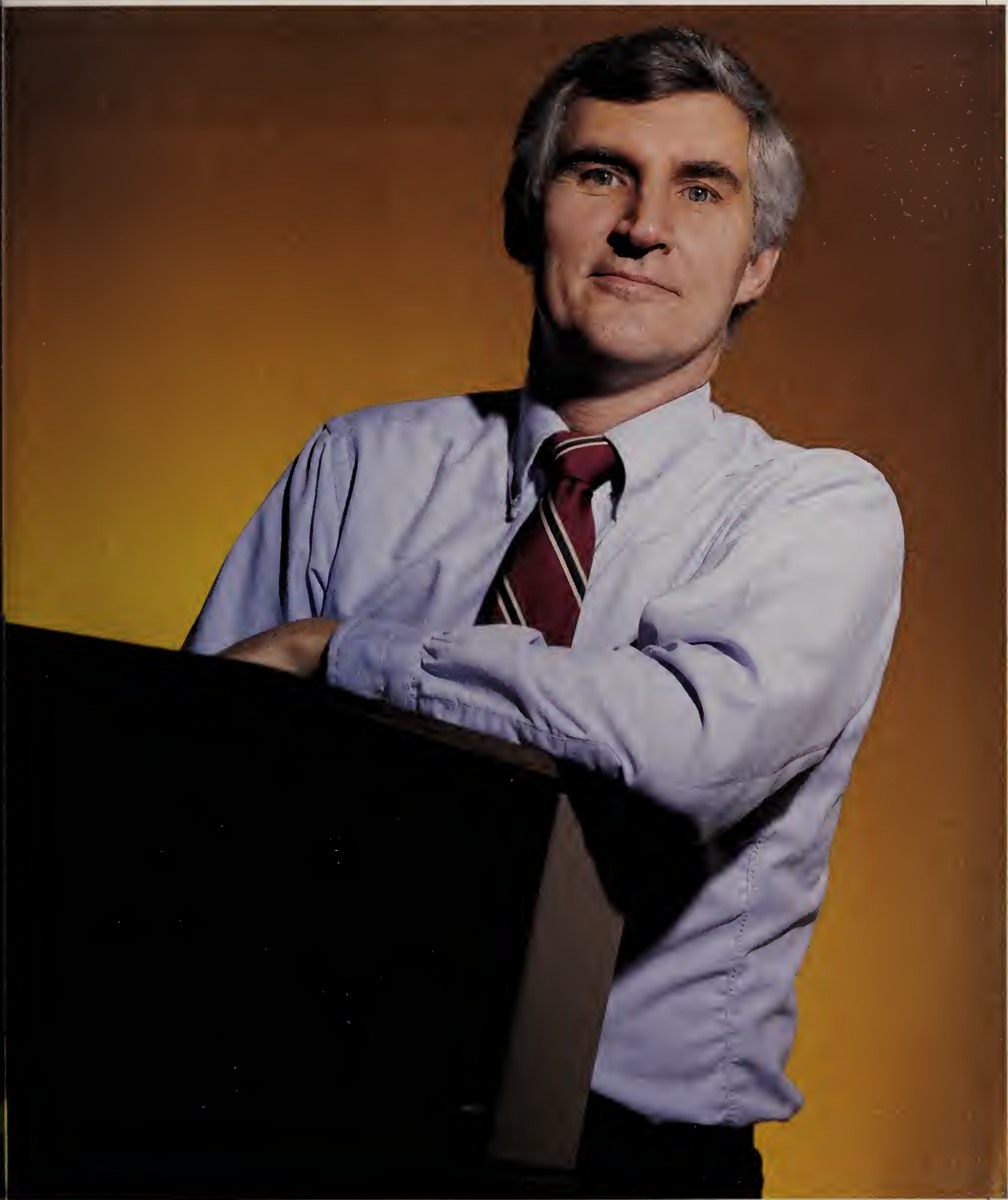
tion that grew up in the shadow of the accounting department. Yet Cooper's view increasingly seems to be that of a minority when it comes to the question of valuing IT. For a growing number of CIOs and IT experts, assigning a hard value to a strategic information system is a slippery task that is unlikely to result in more effective decision-making. In fact, some say, insisting on a dollars-and-cents analysis of every project can seriously damage an organization's competitiveness.

"Anyone who says you have to have hard numbers is wrong," said Eric K. Clemons, an associate professor at the University of Pennsylvania's Wharton School in Philadelphia who directs the school's Project on Strategic and Competitive Information Technology. "Numbers aren't a shield; they're a crutch. The most interesting information-systems projects suffer from the double whammy of uncertainty and intangibles, and if you insist on the numbers you end up with 'analysis paralysis.'"

As an example of how an organization must look beyond numbers, Clemons cited Bell Canada, a client of his that spent "tens of millions of dollars" on increasing the flexibility of its core systems—all without having an explicit cost/benefit analysis. "They built the systems because it was a strategic necessity," he said. "If you decide not to build a strategic system and your competitors end up doing it, you won't just be looking at achieving an advantage; you'll be desperately trying to obtain parity. It's like buying an option on the future survival of your company."

One person that strongly agrees with this assessment is Don Lucas, vice president information systems of Otis Elevator Co., in Farmington, Conn. "We've learned that it's very difficult to quantify the value of some strategic systems," he said. "If you can find a project that will change the way you approach your business [and] that will improve quality and

WARREN HARKNESS, IS



director at Bose, is experimenting with activity accounting, but "it's a slow march."

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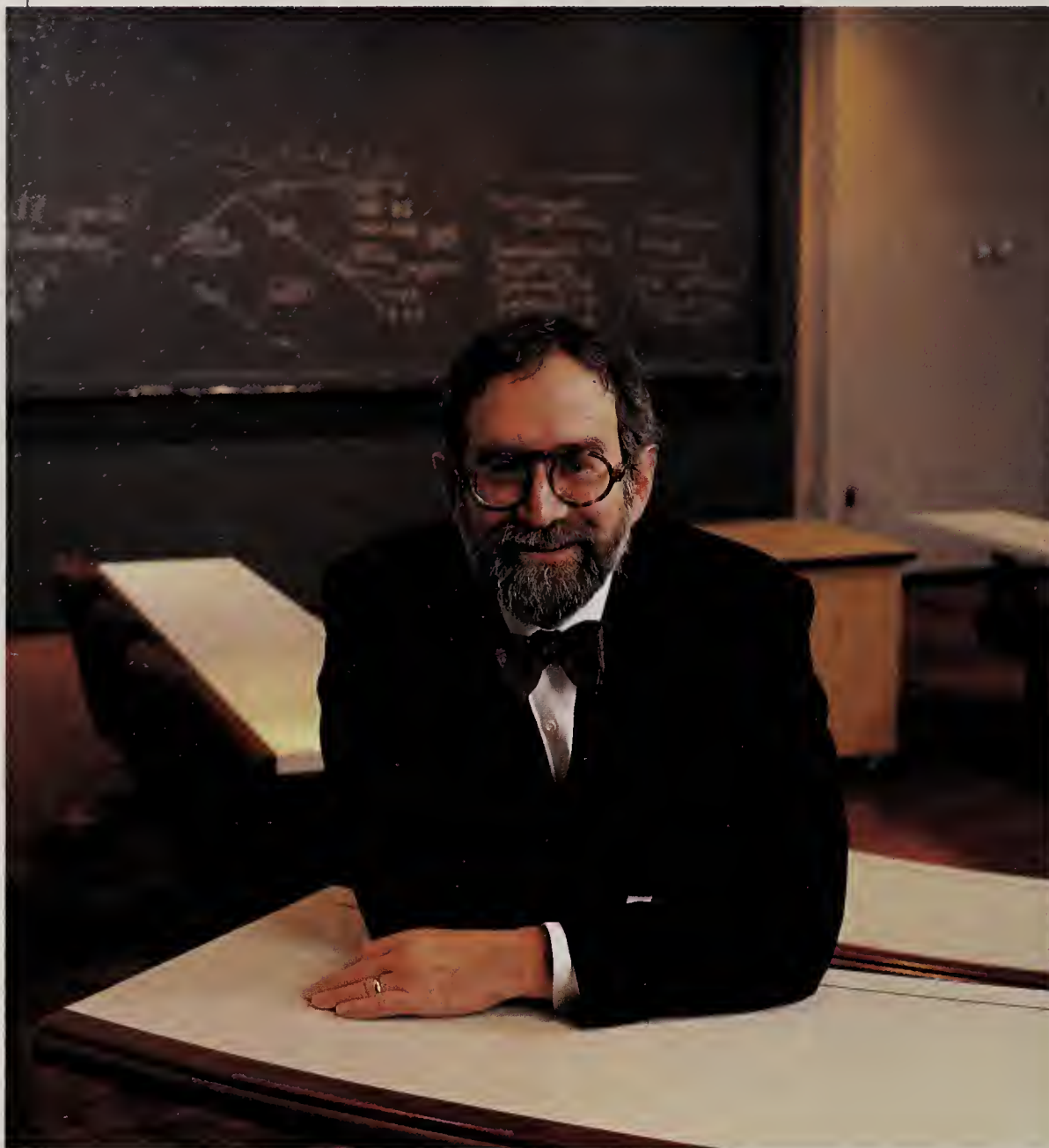
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ERIC K. CLEMONS: "Anyone who says you have to have hard numbers is wrong."

customer service, it's not all that important to quantify what the cost and savings will be."

According to Lucas, this philosophy is partly responsible for the development of OTISLINE, the company's much-acclaimed automated repair dispatching system. More recently, the company has been developing one system that will allow service people to communicate with the dispatching office and with each other via hand-held terminals, and another that will help customers with the complex chore of configuring orders and delivery schedules. "We didn't quantify the savings we'd get out of these systems," Lucas said. "We thought about them a bit, and put together a rough estimate, but the major thrust was to improve our productivity and give a better product to the customer."

Lucas noted that a strategic system that might not have looked like a

sure winner on paper often pays off in ways that couldn't have been anticipated. OTISLINE was intended solely to improve repair-service response time, for example, but the system has resulted in the unexpected bonus of a database of service histories for all its elevators. Now Otis can turn to the database to pinpoint recurring problems. These problems can often be traced to a product design that requires improvement or a service person that could benefit from extra training.

It is not lost on Lucas that the biggest flop he ever had was the system that had the clearest cost-justification. That was a centralized payroll system designed to replace the several incompatible regional systems. When the system was installed, Lucas realized to his horror that the Friday afternoon flood of activity on the new system was more than the corporate mainframe could handle.

The company had to upgrade the mainframe, more than wiping out any savings from the new system. So much for hard-nosed cost/benefits analysis. "I'm not anti-return-on-investment," Lucas said, "but as the business becomes more oriented towards information systems and management understands [them], everyone is thinking less about that return."

Lucas cautioned that being willing to skip the hard numbers doesn't mean indiscriminately throwing money at IT. He noted that Otis's IT ex-

"Numbers aren't a shield; they're a crutch. The most interesting information-systems projects suffer from the double whammy of uncertainty and intangibles, and if you insist on the numbers you end up with 'analysis paralysis.'"

—Eric K. Clemons

penditures are in line with the average manufacturing company's expenditures of 2 to 3 percent of sales. But he added that Otis gets more bang out of its IT dollar by shifting expenditures from traditional systems that tend to emphasize cost-savings toward strategic systems that can impact the earnings side—even if that impact can't be calculated. "Otis's profits have been increasing, and we in information systems like to think a certain part of that is due to our contribution," he said. "I know a lot of people won't build systems unless they can quantify [their return on

investment], but in this environment that's a dangerous thing. I absolutely believe that some of the key strategic systems at many companies never get off the drawing board because it's too difficult to get the return on investment. Just because all your projects have a high rate of return doesn't mean you're a winner."

Gary Biddle, vice president of information and systems technology for the New York-based diversified manufacturer American Standard Inc., agrees with Lucas. "Everyone has changed their views about trying to measure information technology," he said. "It's almost a given now that if you're going to be competitive, you have to spend a certain amount of money to acquire and sustain that edge."

These expenditures have become particularly critical, Biddle noted, in view of the wide-reaching restructuring that is taking place in most companies in almost every industry—a restructuring in which IT has been lagging, according to Biddle. "The focus of a lot of management activity has been to simplify their businesses, to reduce the 14 layers of management to six," he explained. "If you're still running the same systems that supported the 14 layers, you're going to pay for it. You better take a fresh look at the six layers that are left and see how they force the simplification

of your IT portfolio."

When IT is seen as part of the process of making organizations leaner and more responsive to the marketplace, Biddle said, the issue of placing a dollar value on systems starts to become irrelevant. "It takes the focus off the question of IT value, because IT just becomes a necessary component of the way you do business instead of [being] a separate entity."

Also weighing in against the tyranny of strict cost/benefit analyses for IT is Thomas Pettibone, senior vice president information systems for New York Life Insurance Co. "One can spend an awful lot of time trying to figure out dollar-for-dollar values and ending up missing market opportunities because of it," he said. "Time I spend cost-justifying things is time I'm not spending thinking up new ways to help the business."

Sometimes a New York Life IT project is cost-justified by the department that will be benefiting from the system. "Far be it for me to stand in the way of anyone who wants to make that kind of evaluation," Pettibone said. "If someone is controlling the money, he can spend it on commissions for his salespeople, on new furniture, or on an IT project, and he can make the decision any way he wants." Pettibone added that he even lends out his own department's business analysts to assist in the evaluation process.

But in most cases, he said, projects get the green light without anyone having performed a rigorous cost/benefit analysis. For example, one system currently being implemented is reducing the number of steps involved in a key insurance process from 14 to three. Soon, when a customer telephones in, the system will identify the caller's phone number, match the number to a customer, and pull that customer's file up onto the service representative's screen—all before the call has been answered. "I'm sure there are people who would try to put a dollar value on that," said Pettibone, "but I'm not one of them."

He conceded, however, that there

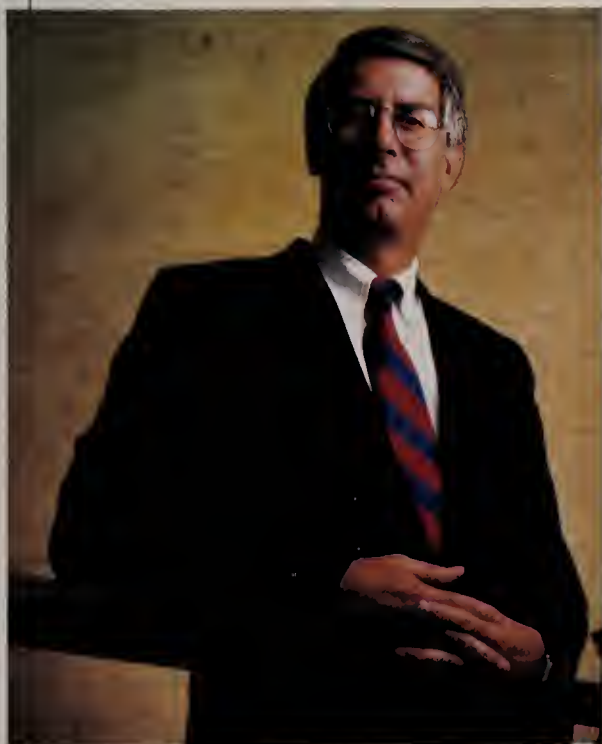
are times when the lack of firm cost/benefit data gives him pause. "If a particular piece of a project has a horrendous price tag, we'll think about it four or five times before proceeding," he said. But he added that regardless of the lack of hard numbers, if the project makes sense, the company will spend the big bucks—

When IT is seen as part of the process of making organizations leaner and more responsive to the marketplace, the issue of placing a dollar value on systems starts to become irrelevant.

like the \$250 million it is currently spending on the latest suite of systems. "We try to keep our focus on the right place," he said. "If you can come up with a high quality product that sells like mad, you can absorb a lot of costs."

But even those CIOs and experts that insist strategic IT won't sit still for a hard-nosed cost/benefit analysis concede that organizations need some way to ensure that IT expenditures aren't exceeding what the organization is getting in return.

Biddle, for example, focuses on building systems that eliminate the "non-value-added" components of business processes. "If you look at everything that occurs in your business between the time a customer develops a need for your product and the time you deliver the product to the customer, you find that most of the things that take place actually don't add much value." Eliminating or shortening those processes that don't add value increases productivity and makes the organization more respon-



THOMAS PETTIBONE: time better spent

Compared to HP's NewWave Office, IBM's

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There is a better way.



**HEWLETT
PACKARD**

sive to customers, he explained. And if an IT project can help with this mission, it's worth the cost.

For instance, Biddle said, EDI projects pay off because they eliminate the non-value-added time that a salesperson carries an order around in his or her briefcase. In fact, he said, even relatively expensive IT efforts that support cutting out non-value-added components tend to be far less capital-intensive—and far more effective—than the usual prescriptions for revitalizing U.S. business.

Wharton's Clemons, who consults on strategic IT to a variety of major organizations worldwide, agrees that organizations need some sort of effective evaluation process for IT. "I'm

of up-to-snuff project managers, overly rapid changes in system requirements, and even impatient stockholders. "Every form of risk has to be managed," he said.

Hard numbers aren't the enemy, Clemons continued, as long as executives accept the fact that they're not available for many strategic projects. "Sometimes you can be very quantitative," he said, "[and] sometimes there are no numbers at all. . . . Sometimes it's a combination of the two. If you've got the numbers, you should use them, of course. Just don't try to beat a specific ROI with every system."

Warren Harkness, director, information services for audio component manufacturer Bose Corp. in Framingham, Mass., has thought a great deal about the advantages and dangers of playing it by the numbers. "I go 180 degrees on this issue," he said. "Sometimes I fervently feel that you have to measure the value of information systems—but then how do you measure the fact that American Hospital Supply can increase its market share and lock in customers with an order-entry system?"

One way to get a better handle on IT value in some situations, Harkness said, is to switch to "activity accounting," in which costs are broken down not by

decided to switch to a new type of clip, and the cost of processing orders plummeted, the company would then know it made a wise choice.

That could work for IT, too, Hark-

But even those CIOs and experts that insist strategic IT won't sit still for a hard-nosed cost/benefit analysis concede that organizations need some way to ensure that IT expenditures aren't exceeding what the organization is getting in return.

ness continued—if a company were willing to make the huge investment required to convert to activity accounting. Harkness is experimenting with activity accounting now, but he's not banking on quick results. "I'm trying to drive the organization to understand everybody's deliverables in terms of quantifiable metrics," he said. "It's human nature to say, 'We spent 120 hours coding this,' but I'd respond, 'So what? What did you produce that our customers need, and what does that deliverable cost compared to what we delivered last year?' This approach is great in terms of training and education, but there's a long learning curve. It's a slow march."

In the end, Harkness admitted, he has as much trouble measuring IT's contribution to improvements in intangibles like customer responsiveness and time to market as does anyone else. One recent Bose system, for example, places bar-code scanners on the company's shipping



DON LUCAS's worst flop had clearest cost-justification.

certainly not talking about flying by the seat of your pants," he said. Clemons believes that the key to investing effectively in strategic IT is to institute a set of procedures for dealing effectively with risk (see related story, Page 40). Risk can come from several different directions, he noted, including unproven technology, a lack

how the money was spent, but by how the expenditures contributed to the organization's various functions. Thus, for example, instead of tracking how much is spent in total on paper clips, a company would track what it costs to process a customer order, of which paper clips would be a contributing cost. If the company



GARY BIDDLE: *"If you're going to be competitive, you have to spend a certain amount of money to acquire and sustain that edge."*

docks to allow instant auditing of all shipments for accuracy. "To value this, we just stated we'd be increasing customer satisfaction," he said. "You can't measure this kind of effect on a firm unless you can measure the whole firm and separate out the other variables. That's such a horrendous analysis and measurement task that I'm not sure you could sort it out without many years of effort."

Perhaps not surprisingly, there is a company out there whose business it is to do just that. The company is New York-based Business Science International (BSI), and it has spent 20 years developing a rigorous and exhaustive methodology for valuing IT. The key, according to President Peter Karp, is to reverse the process most companies would use. "Everyone else looks at a technology and then tries to determine [its] business implications," he explained. "We

start by moving through the business talking to 'value managers,' and look at technology much later on."

By value managers, Karp means those non-IT managers who are in a position to determine when a change has an impact on the effectiveness of the organization. "The information systems department may start providing reports on a weekly basis instead of every six weeks, and everyone thinks that's all marvelous," he said. "But if the value manager who gets those reports admits that there are essentially no new decisions made because of the greater timeliness, then we say the improvement has no value. The person who is responsible for the bottom-line effect has to be the one who feels the technology is significant and important."

After interviewing all the value managers in the business, BSI places each identified improvement into

categories such as improvements in effectiveness, improvements in efficiency, and even a category that includes such nebulous concepts as improvements in leadership. Each category is then weighed to determine its relative impact on the whole business, so that the improvements in that category can be translated into a dollar contribution to the company's bottom line. Finally, BSI attempts to filter out that part of each contribution that can't be wholly ascribed to technology. "The question is, can technology claim 100 percent of the credit for an improvement in the process it is affecting?" said Karp. "Our answer is, almost never."

In the end, BSI provides the company it has studied with data on how technology has impacted each segment of its business, expressed as a percentage of total sales. "We can assess how much value seems to be

How To Survive Without Numbers

.....

Seven steps to enable the CIO to be merely singed, and not incinerated, by risk

OK, so you've accepted the fact that for many important IT projects you can't get anything resembling reliable numbers for a quantitative cost/benefit analysis. Does that mean you've got to be resigned to the strong possibility of being burned? Yes, it does, according to Eric K. Clemons, an associate professor at the Wharton School and director of the school's Project on Strategic and Competitive Information Technology. But Clemons insists there are ways of reducing the number of times you get burned. Here are seven techniques he recommends:

- Rank your alternatives. Are you sure there isn't some lower-risk, higher-payoff way of achieving your goals? Is doing nothing an acceptable course of action in this case?

- Perform a sensitivity analysis. Some projects end up paying off even if they fall short of expectations. But for other projects, a miss is as good as a mile. Knowing the distinction provides a greater margin for error.



CLEMONS: Risk has to be managed.

- Make decisions sequentially. By breaking the project into phases and providing bail-out points at each step, you'll make sure you have a way of cutting your losses if the project isn't panning out. Prototyping is one of the best ways of putting up a safety net. "Merrill Lynch and McKesson put their best systems together with twine, coat hangers and chewing gum before they committed hundreds of millions of dollars," noted Clemons.

- Identify and seek to minimize all forms of risk. These include technical risk, where you may not be able to

count on the technology; functional risk, where you may not have a solid, long-term handle on the system requirements; and even political risk, where management changes and stockholder developments can affect success.

- Keep all possible upsides in mind. One potential benefit of major projects that is often overlooked is the possibility that it can be sold as a product or service, as some airlines have done with customer reservation services. "Software is easy to clone," said Clemons.

- As Harvard Business School Prof. F. Warren McFarlan advises, manage a portfolio of applications. Instead of making decisions based only a particular project's cost/benefits, consider the likely payoff of an entire range of projects. That way, embarking on an occasional high-risk/high-payoff project makes sense, as long as it's balanced by less risky projects. "American Express's strategic technology group is expected to produce a certain number of failures," said Clemons. "If they don't, they're not cutting it close enough."

- If you can get numbers, use them. Hey, nobody said you couldn't *ever* do things the easy way.

—D. Freedman

coming from applications in finance, in R&D, or in field sales," said Karp. "Management can then look ahead to the future and establish priorities for applications within each of these functions." BSI also provides average industry figures for each function, allowing a company to see where it is lagging behind or jumping ahead of its competitors in the application of technology. The answers can be surprising—like the time BSI discovered that the huge savings in travel expenses one company had achieved by installing a global video-conferencing system were canceled out several times over by decreased customer satisfaction and product-development snags caused by the lack of face-to-face contact.

Ready to sign up? Not so fast. BSI generally doesn't work on behalf of the organizations it studies. Its clients are the companies that sell information technology to those organizations. One major client, for example, is a gigantic computer company whose three-letter name you'd recognize in a minute. To get BSI to value your investment in information technology, you'll just have to wait until some big vendor hires it to do a study of your industry. So far, BSI has researched the consumer packaged goods, pharmaceuticals and medical services industries. Coming up, said Karp, are studies of several large manufacturing industries.

Unless BSI comes knocking, it seems that CIOs are stuck with having to help their organizations make some difficult IT decisions without the benefit of hard data. But, then again, as Clemons pointed out, that's what executives are there for in the first place. "If you know the ROI on a project is going to be twice treasuries and that a project is risk-free, then what kind of decision is that? To demand that the numbers be in place is abrogating management's responsibility to make difficult decisions." Maybe that's one way of measuring the value of a CIO. ☐

David Freedman is a freelance writer based in Brookline, Mass.

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GETTING A HANDLE

Now that the skeptics have been won over, the question for most organizations is not whether to implement CASE, but how to do it

BY MICKEY WILLIAMSON

As if mounting development backlogs and constantly increasing competitive pressure weren't enough to inspire automation of the systems-development life cycle, companies today are faced with some dismaying demographic trends. While the demand for skilled programmers continues to grow, the supply is shrinking—and there is no end in sight.

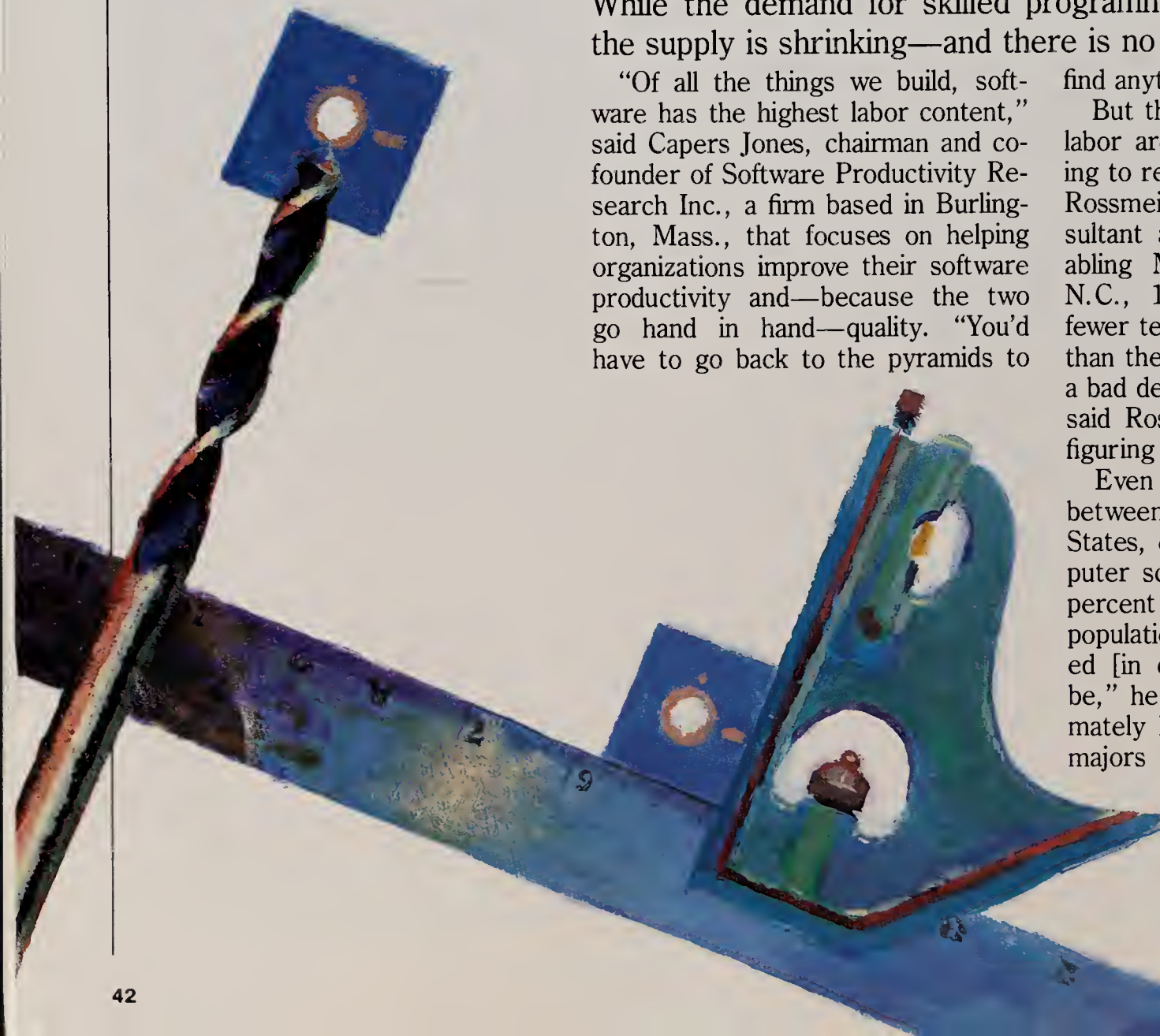
"Of all the things we build, software has the highest labor content," said Capers Jones, chairman and co-founder of Software Productivity Research Inc., a firm based in Burlington, Mass., that focuses on helping organizations improve their software productivity and—because the two go hand in hand—quality. "You'd have to go back to the pyramids to

find anything comparable."

But the people to perform all that labor are becoming scarce. According to research done in 1987 by John Rossmeisel, application enabling consultant at the IBM Application Enabling Marketing Center in Cary, N.C., 1990 arrived with 9 million fewer teenagers in the United States than there were in 1980. "That's not a bad deal if you have to raise them," said Rossmeisel, "but it is if you're figuring on hiring them."

Even worse, Rossmeisel found, between 1980 and 1987 in the United States, enrollment in university computer science curricula fell from 8.6 percent to 3.2 percent of the student population. "They aren't as interested [in computers] as they used to be," he said. What's more, approximately half of the computer science majors are foreign nationals—most of whom intend to return home with their sheepskins.

Meanwhile, the vast majority of people who flocked to the information



ON CASE

systems profession in the mid-1960s with the advent of the IBM System/360 are going to retire at the end of this century. "The long and short of it," Rossmeisel summed up, "is that there are going to be more people leaving the data processing profession around the year 2000 than there are entering."

By the end of the 1990s, then—and probably sooner than that—labor-starved IS managers will need other ways to get their software built. One option is to go overseas to find programming talent. Another is to cultivate application-development skills among the organizations requesting the applications. A third is to decrease the direct labor component of the systems-development life cycle. All three choices point to computer-aided systems engineering, or CASE, techniques.

According to Rossmeisel, "What's demanded is that analysis and design have to be done infinitely better than they are now, in order to pass the specifications either to [programmers in] Singapore, Jakarta or Taiwan, to an automatic [code] generator, or to an end user." In any case, whatever talent remains in the IS shop will be needed on the front end of the development life cycle. IS management will have to look to automated software engineering techniques to optimize each individual's performance.

An understanding of the impending labor crunch has prompted IS management to take a closer look at CASE tools in the past year. Also contributing mightily to the growing awareness and acceptance of CASE

was IBM's announcement last September that it intends to furnish CASE technology to its customers. Although IBM has yet to release the first of its AD/Cycle products, its recognition of the value and market potential of the technology was sufficient validation for all but the most resolute of skeptics.

Vendors no longer find it difficult to sell information systems executives on the concept of CASE. "A year ago we were still in a missionary mode, convincing people that CASE was a better way of doing application development," said Peter Privateer, director of product programs at KnowledgeWare Inc., a CASE tool vendor in Atlanta. Now that the basis for competition has moved away from being a matter of CASE or no-CASE, vendors find themselves competing against each other on philosophy and functionality.

Today the question in the minds of IS executives isn't whether to imple-

ment CASE, but how to do it. In his visits with CIOs, David Holroyd, president and CEO of tool vendor Cortex Corp. in Waltham, Mass., has found that "the concerns at the moment are how to bring method and control in with the tools, and how to change

the people and their attitudes to enable them to use the methods and tools successfully." Such talk invariably leads to the two hot CASE topics of 1990: methodology and tool integration.

A methodology—not to be con-

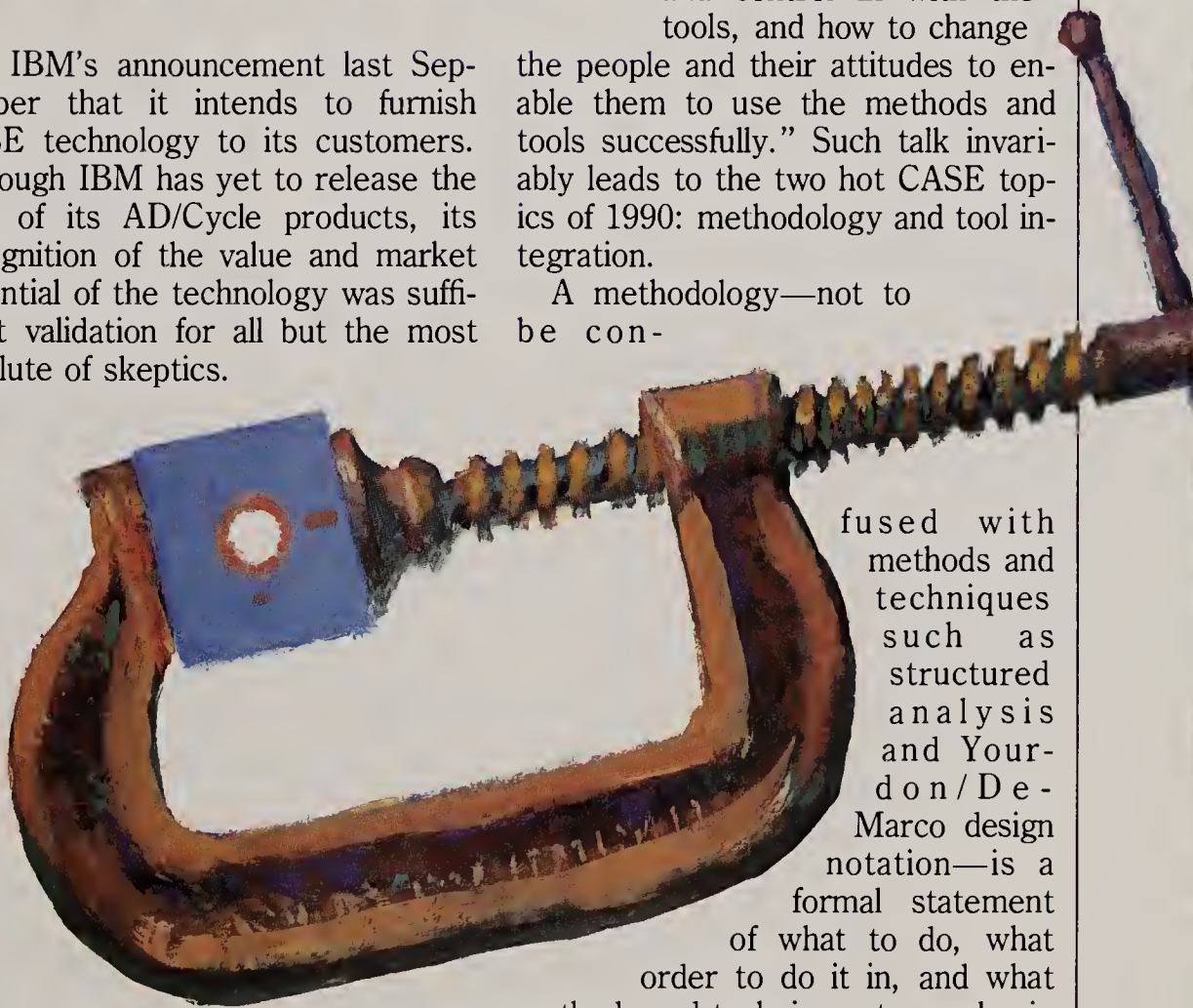
fused with methods and techniques such as structured analysis and Yourdon/DeMarco design notation—is a formal statement

of what to do, what order to do it in, and what

methods and techniques to employ in carrying it out. Integration refers to the ability of CASE tools from different vendors to work together, sharing a single database of design information and a common set of behavioral characteristics. That is precisely what IBM has promised to furnish to its customers in stages over the next several years.

Tool integration may be something for the future (although a few vendors argue that they have it now), but software-development methodologies are here today in abundance.

One school of thought among CASE consultants holds that companies must implement a formal, man-





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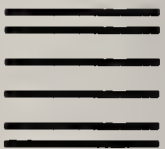
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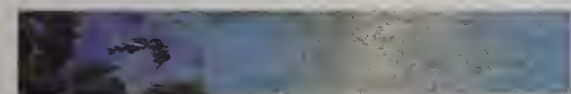


ual methodology before anyone ever sets hands on a CASE tool. Many experts disagree. "A lot of industry pundits have expressed the notion that you have to be proficient in a manual methodology before you could ever take advantage of a CASE



"Of all the things we build, software has the highest labor content. You'd have to go back to the pyramids to find anything comparable."

—Capers Jones



tool," said Privateer. "I don't think they have had much real-world experience in how CASE has been successfully implemented."

In the broadest sense of the term, every systems-development organization has some sort of methodology. People don't just dream up ideas for new applications and build them without user interviews, checkpoints, reports and requests for authorization to continue along the way.

Formal methodologies can be bought, as well. They vary greatly in philosophy—top down or bottom up, data analysis or business analysis first—as well as in types of diagrams used and the quantity and nature of deliverables specified. One of the best-known is information engineering, pioneered by Clive Finkelstein and Ian Palmer, popularized by James Martin, and taught, sold and carried out in varying forms by consulting organizations such as Ernst and Young (New York), James Martin Associates (Reston, Va.) and Information Engineering Systems Corp. (Arlington, Va.).

McDonnell Douglas Corp., of St. Louis, sells a methodology called

Stradis. The methodologies Merise (developed by a French consortium) and SSADM (Structured Systems Analysis and Design Methodology, developed by the British firm Learmonth Burchett Management Systems) are more popular in Europe than in the United States. IBM pioneered Joint Application Design as a way to get IS professionals to make hardware purchase decisions and now offers training in the methodology, as do several consultancies.

But whatever methodology an organization uses, it will have to be modified when CASE tools come on the scene. It makes sense, then, to question the wisdom of changing the way people do their jobs to incorporate a paper-based methodology, and then changing yet again to accommodate automation.

Seeking a way to blend automated development with a formal methodology, Du Pont Information Engineering Associates (IEA), a business unit of the Wilmington, Del., chemicals company, developed a methodology called RIPP (Rapid Iterative Production Prototyping). RIPP was created for internal use, but now IEA teaches the procedures to external clients as well. Late in 1989, James Martin went public with his version of RIPP, which he labeled RAD, for Rapid Application Development.

The recent emphasis on rapid development reflects a growing dissatisfaction among the sponsors of business applications with the fact that by the time they are delivered, few systems meet the business needs of the organization that commissioned their development. Coming in on time and on budget and meeting requirements set out in a specifications document is no longer good enough. According to Scott Shultz, now manager of Du Pont IEA, even after IS had achieved a 94 percent success rate in terms of deadlines, budget and stated require-

ments, the user community was still not satisfied. And so Shultz led Du Pont's 150-member corporate IS organization through adoption of its first formal methodology, a combination of Stradis and some Du Pont additions.

Managers of DP shops throughout Du Pont sent Shultz's organization a message. As Shultz put it, "They said, 'This isn't working. We've got to get it done cheaper, faster, and such that the requirements meet the need on the day of delivery. We've got to use this large computing capability that we have to more advantage for the corporate bottom line, not just in cost-reduction programs but also for competitive advantage.'"

Working within Du Pont's textile fibers division—which is large enough to be a Fortune 100 company in its own right if it weren't a business unit of a member of the Fortune 10—Shultz and his team searched for a

CASE tool and a methodology that could harness its power. They found a suitable tool easily enough, but finding a methodology turned out to be impossible. "We could find all the [systems-development life cycle methodology-



gies] we wanted in the traditional sense—the multi-phase analysis-design-construction-testing-implementation types," he said. "But we couldn't find anything that was designed to take advantage of the high-powered tools. So we ended up creating our own methodology."

The trouble with conventional methodologies, according to Shultz,

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is that most automate a strictly sequential development process. Once one phase is completed there is no turning back, which militates against letting users change the system requirements along the way. RIPP, RAD and a growing number of var-



RIPP emphasizes building a working prototype and then modifying it and adding functionality as development progresses.



iants are based on two elements: the use of small development teams, and the use of prototyping as the basic development technique.

Both methodologies recommend breaking the development project down into pieces that can be completed in 60 to 90 days, to keep up with rapidly changing business conditions. Martin calls RAD development groups SWAT (specialists with advanced tools) teams. He says these teams should usually consist of two to four highly capable people equipped with and drilled in the use of the most powerful CASE tools available. RIPP emphasizes building a working prototype—not just sample screens, but a working system that can handle input data, something the users can try out and comment on—and then modifying it and adding functionality as development progresses.

A key component in current thinking about application development is the constant and intimate involvement in the process of the people who will use the resulting product. Said Holroyd: "Our view is that you have to accept from the very beginning that you will not succeed if you try to do it the same way as you have

Selected Vendors of CASE Tools

VENDOR	LOCATION	PRODUCT
Advanced Logical Software	Beverly Hills, Calif.	Anatool/Blues Series
Asyst Technologies Inc.	Naperville, Ill.	Developer
Bachman Information Systems Inc.	Burlington, Mass.	Bachman/Re-Engineering Product Set
Cadre Technologies Inc.	Providence, R.I.	Teamwork
Cadware Inc.	New Haven, Conn.	Sylva Foundry
Computer Systems Advisers Inc.	Woodcliff Lake, N.J.	POSE
Cortex Corp.	Waltham, Mass.	Corvision
Digital Equipment Corp.	Nashua, N.H.	DECdesign
Interactive Development Environments	San Francisco	Software Through Pictures
Index Technology Corp.	Cambridge, Mass.	Excelsator; PC Prism
KnowledgeWare Inc.	Atlanta	Information Engineering Workbench; Gamma
Learmonth & Burchett Management Systems Inc.	Houston	Auto-Mate Plus; Strategic Planner
Language Technology Inc.	Salem, Mass.	Recorder
Manager Software Products Inc.	Lexington, Mass.	Manager Family
Nastec Corp.	Southfield, Mich.	DesignAid
Netron Inc.	Toronto	Netron/CAP
Oracle Corp.	Belmont, Calif.	CASE family
Pansophic Systems Inc.	Lisle, Ill.	Telon
Popkin Software & Systems Inc.	New York	System Architect
Scandura Intelligent Systems	Narberth, Pa.	Prodoc
Softlab Inc.	San Francisco	Maestro
Software AG of North America	Reston, Va.	Predict CASE
Syscorp International	Austin, Texas	MicroSTEP
Texas Instruments	Plano, Texas	Information Engineering Facility
Transform Logic	Scottsdale, Ariz.	Transform
Viasoft	Phoenix, Ariz.	VIA/Center
Visible Systems Corp.	Waltham, Mass.	Visible Analyst Workbench family
XA Systems Corp.	Los Gatos, Calif.	Pathvu; Retrofit; Goldrun; Silverrun
NOTE: Some major consulting firms such as Arthur Andersen and Ernst & Young offer CASE tools that are only available packaged with consulting services.		
SOURCE: Excerpted from a chart in CASE Strategies.		

done it with traditional techniques. You have to adopt an approach that allows for a greater involvement with the actual end user of the systems that you are aiming to develop."

Keeping up with changing requirements is not the only reason for increasing user involvement. Thanks in large part to the advent of personal computers, the people who use com-

puter systems are far more sophisticated about the technology than they were even five years ago. A fact that IS people don't like to consider is that there are businesspeople in every organization who could—and even more who *think* they could—build their own applications, if management gave them the time and resources to do it. But development is

PLATFORM	APPLICATION TYPE
MAC	T/I
PC, MF	T/I
M/W	I
PC, M/W, VAX	T/I
PC, M/W, VAX	T/I
PC	I
PC, VAX	T/I
M/W, VAX	I
M/W, VAX	T/I
PC, M/W, MF, VAX	T/I
PC, MF	I
PC	I
MF	I
PC, MF	I
PC, MF, VAX	T/I
PC, MF, VAX	I
PC, MF, VAX	I
PC, MF	I
PC	T/I
PC	T/I
PC, MF	I
PC, MF	I
PC	I
PC, MF	I
PC, MF	I
MF	I
PC	T/I
PC, MAC, M/W, MF, VAX	I

Key to Abbreviations Used

PLATFORM:

PC = MS-DOS machine, stand-alone or requiring mainframe or minicomputer for some functions

MAC = Apple Macintosh

M/W = Mini/workstation, e.g. Apollo, Sun, Data General

MF = IBM mainframe or plug compatible

VAX = DEC VAX, MicroVax or VAXstation.

APPLICATION TYPE:

T = Technical, real time, embedded or scientific

I = Information systems, online or batch.

the job of the IS organization, not of the ultimate users, and the developers had better keep in close touch with the users to be sure that the result is as good as they think they could have done on their own.

Along with the growing emphasis on more rigor in the application-development process and on the need for user involvement comes the push for systems of higher quality. While CASE was still hard to sell, vendors got the attention of potential customers by talking about productivity. "In the early days, we were pioneers charging up the hill and trying to get people to pay attention to us," said KnowledgeWare's Privateer. "If we used the word productivity, people noticed us. Perhaps to some degree we oversold the notion of productivity. I had one VP of MIS tell me he'd be able to lay everybody off and the shop could run itself, if you believed everybody's claim for productivity."

The fact is, if productivity is defined as the number of lines of code produced in the first few months after developers have been given a new CASE tool, then their productivity is apt to decrease compared with paper-and-pencil methods. But that definition, while common, is short-sighted and misleading. Productivity should be measured over the life of the system, not just the time it took to build it. The real gains come from reductions in design and programming errors, and from building systems that are easier to maintain and enhance.

A common rule of thumb for determining the relative cost of error correction during the systems-development life cycle is that the cost increases tenfold, like the Richter scale of earthquake energy, from stage to stage. That is, if it costs one dollar to fix a mistake during analysis, fixing that same error costs \$10

during design, \$100 during coding, and \$1,000 if it survives into implementation and maintenance.

CASE is not a magic potion for preventing errors. "A fool with a tool is still a fool," is a common aphorism in the IS shop. Improperly used, a CASE tool simply lets developers make more mistakes faster. But a tool that checks for consistency and completeness among diagrams will, if the checking routines are run, prevent design of a business process that goes nowhere, or a database table that has no way to get data into it, for example.

One measure of quality-based productivity is the number of change requests in the first few weeks after a new system is installed. This pro-

Tool integration may be something for the future, but software-development methodologies are here today in abundance.

vides an indication of how well the system meets users' current requirements. Many CASE tools contain a requirements-tracking component that links features in the application to requirements identified in analysis and flags requirements for which no feature exists.

Another measure of quality is the number of coding errors in the implemented system. Automatic code generators that can accept analysis and design input from front-end CASE tools minimize (some vendors claim they can eliminate) such programming mistakes.

Consider the usually wide disparity between system documentation and

the program as it actually exists. One CASE tool philosophy holds that program enhancements and maintenance should be carried out at the system



CASE is not a magic potion for preventing errors. "A fool with a tool is still a fool," is a common aphorism in the IS shop.

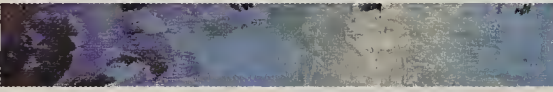


diagram level, so that technical documentation invariably matches the running program, reducing the expense of maintenance. That's another place where the CASE tool payoff becomes real.

The ultimate goal of automated software engineering will be reached when a well-thought-out description of a business application can be turned into a running computer program at the push of a button. "Design into code," or more formally, declarative process specification, is the grail of today's CASE vendors.

Nobody has found the grail yet, but a few vendors are on the way. Cortex, Texas Instruments and KnowledgeWare have code generators as part of their product offerings. Michael Watters, vice president and general manager of TI's Advanced Information Management Division in Dallas, said his organization is monitoring some six million lines of code generated by its Information Engineering Facility at four customer sites. "There has not been a single abend [system crash] in any generated code," he said.

The rub comes when the IS department wants to use different CASE tools, from different vendors, for successive stages of the development process. This is the "best-in-class" strategy that IBM's AD/Cycle

product line will eventually support, but only for customers willing to commit to DB2 and OS/2 with Presentation Manager for their development environment.

Apparently recognizing that it cannot supply under the Big Blue label all the CASE tool functionality its customers want, IBM set out to develop a repository for design information. It will be implemented in DB2 and will be accessible to a host of CASE tools running under OS/2 Extended Edition through a cluster of IBM products called, collectively, the Application Development Platform. IBM has promised to publish the specifications of its design database so that vendors will be able to modify their products to put design information into or take it out of the IBM repository.

Since IBM's AD/Cycle announcement, nearly 40 CASE tool vendors have announced their intention to comply with whatever repository standards IBM sets. IBM also took equity positions in three major CASE vendors: Index Technology Corp. in Cambridge, Mass., and KnowledgeWare—top competitors for dominance in the market for "front-end" analysis and design tools—and Bachman Information Systems Inc. in Burlington, Mass., leader in the "back-end" re-engineering market. Further, IBM bought technology rights to KnowledgeWare's design encyclopedia, presumably as the basis for the forthcoming repository's information model.

What that information model will look like is of supreme interest to CASE vendors.

If tools are to work together fully, then they must all share a view of which design information is important, and what it looks like when it is stored in a single location. The repository must store not only the names and attributes of data elements and business rules (for example, the terms under which a customer is granted credit in an order-entry system), but also representations of diagrams, information on the environment in which the system will operate, what host facilities the application will require access to, what program libraries must be available when the application runs, and much more.

Integration means, too, having a user interface that does not vary from tool to tool. After learning to navi-



gate in one product, AD/Cycle users will be able to navigate in all tools, as long as the tools comply with IBM's Common User Access specification, embodied in the Presentation Manager of OS/2.

If IBM delivers on its AD/Cycle promise—and there is no reason to doubt that it will, eventually—a large

number of CASE tools will be able to work together in peace and harmony in the IBM/MVS/DB2/transaction processing/host-based environment. On the VAX/VMS side, Digital Equipment Corp. is extending its dictionary product, CDD+, to have similar capabilities.

Not all software development concentrates on information systems, however. In the technical CASE marketplace, where people build complex systems (often for space or military-related purposes) and write microcode for processors embedded in everything from automobile fuel pumps to microwave ovens, Atherton Technology in Sunnyvale, Calif., provides the Software BackPlane, an integrated project-support environment (IPSE) that provides a design database and common user interface for a variety of tools in the VAX/VMS, VAX/Unix and Sun 3 computer families.

Thus, integrating CASE tools is not the sole province of IBM, although IBM's announced intention to do so has meant a big boost to the entire CASE industry. Still, there is concern among vendors about customer perceptions if IBM fails to deliver its promised technology reasonably close to its promised deliv-

tion that "CASE will never be successful.

"The biggest concern I have is that people not equate the success of a new way of designing and building systems with the success of one vendor in delivering it," Grejtak continued. "The repository is a means to an end; it is not the end unto itself. If



"Design into code" or more formally, declarative process specification, is the grail of today's CASE vendors.



we can't get that straight in the minds of the marketplace, we're going to have a real problem. . . . Endgame is not the repository. Endgame really is when people have achieved the tenfold improvements in productivity that are associated with concepts such as better design up front, the ability to reuse components, and the ability to better document systems throughout the process. It's when people can implement better engineering discipline into the designing and building of systems. The repository helps us to do that, but it is not the only way to do it."

In Cupertino, Calif., Apple Computer Corp. is hoping that IS organizations will come to see the Macintosh as the way to implement CASE.

Apple sees CASE as key to its strategy to enter the information systems marketplace. According to Michael West, manager of Apple's CASE Technologies division, the Macintosh has not been well understood by IS managers. It's his job to correct that deficiency.

To accomplish that, West refers

to the Mac's common user interface and its ability to share information among applications. With hundreds of CASE tools running on the Macintosh, communication capabilities with virtually any platform imaginable, and a substantial number of unauthorized Macs already in the corporate world, CASE on the Mac is not only a workable option, West said, but also one that is more flexible than the solution IBM proposes.

"Batch [processing] doesn't do it any more," West said. "We are moving into a new era of computing based upon the network model. We're going to see all kinds of different applications talking to each other from various parts of the network—and this is going to happen faster than anybody thinks."

What's needed, he continued, is a broader range of solutions than the AD/Cycle model offers. Not that the repository concept isn't important—it is. But, he said, "the way IBM is [making] the repository the top-down administrative switching yard looks to us to be dangerous, expensive and overhead-oriented—and the last thing we need is more overhead."

Whatever flavor of CASE prevails—and it's reasonable to expect there to be several—the bottom line is this: In most industries it's already too late to speak of adopting CASE technology to gain competitive advantage. The question now facing most organizations is how to keep up with the competition. In general, it takes two or three software-development cycles before an individual developer becomes proficient with any CASE product, even with help from a trainer or experienced tool user. CIOs who ignore the need to formalize the systems-development process, or who skimp on the training and support required to help their developers learn the new tools and techniques, do so at their peril, and at the peril of the organizations they serve. ☐

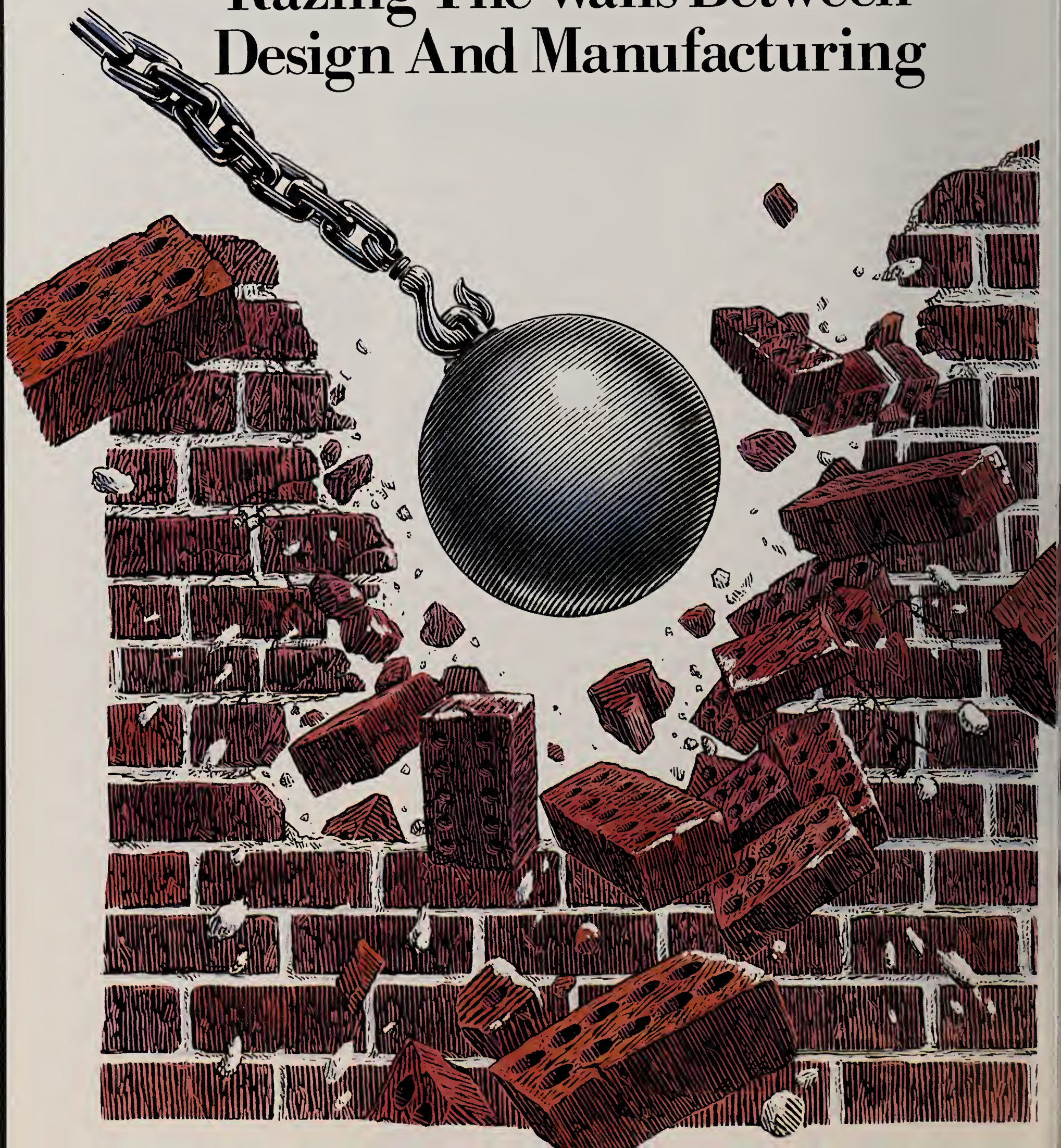
Mickey Williamson heads The Querty Group, technical journalists based in Warwick, Mass. She edits the newsletter CASE Strategies, and is a veteran observer of the CASE scene.

ery dates.

Chris Grejtak, former vice president of marketing at Index Technology, envisioned the possibility that prospective customers might interpret slippage in IBM's AD/Cycle repository product delivery schedule as an indica-

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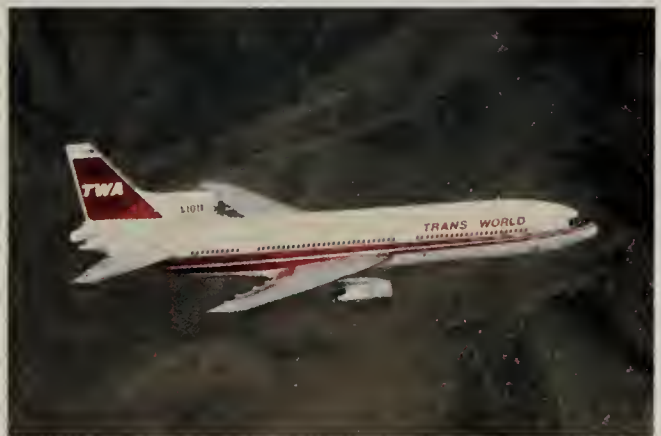
Implementing
CASE can exact
a heavy toll
on employees.
But no pain,
no gain

BY PAUL KONSTADT

CASE is being used to help whittle Trans World Airlines Inc.'s ungainly mountain of antiquated computer program code down to a neat and well-proportioned molehill—a major component of the company's strategic effort to boost its chances of survival during the airline industry's battles of the 1990s.

But the benefits of revolutionary information technology are sometimes realized only painfully, and TWA has already learned some costly lessons about the price it will ultimately pay for the commitment to CASE from staff and management, and for the determined effort required to overcome internal resistance.

"It's almost like a religious conversion, it takes that kind of enthusiasm," said Cloene



JAMES NEWKIRK: *making CASE fly for TWA*



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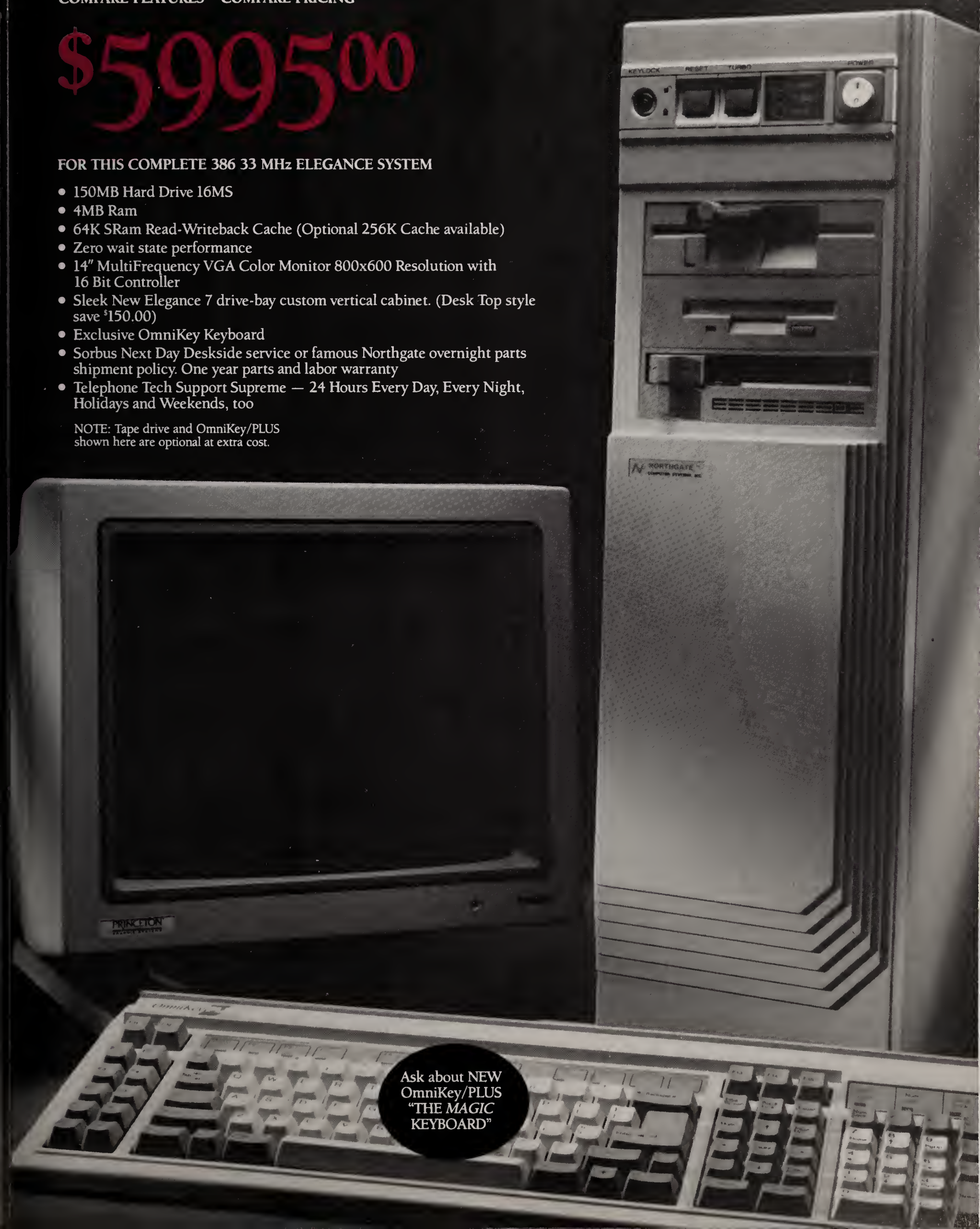
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Goldsborough, the airline's director of data resource management and the leader of TWA's CASE project. "[And] it truly is a matter of survival [since] information technology is a key component to those airlines who will be winners in the '90s."

TWA's commitment to CASE began in 1987 with a simple imperative, according to James Newkirk, the airline's staff vice president for informa-

"Implementing CASE is almost like a religious conversion, it takes that kind of enthusiasm."

—Cloene Goldsborough

tion resource management. "We had to automate ourselves. There was very little concept of modern technology [at TWA]. We had fallen tremendously behind."

Data were kept in "flat files," using software whose origins lay in the dim past of punch-card programming. Program updates wound like strands of spaghetti amid the 20 million lines of code accumulated over the years, and as much as two-thirds of the staff of the information services department was committed to simply maintaining the jerry-built patchwork. An all-at-once replacement of the software and databases would have cost hundreds of millions of dollars—"just too expensive," Goldsborough said—so the department instead opted for CASE as a way to upgrade the information system segment by segment, and at the same time re-engineer it to provide better service to end users.

"We want to reshape data processing to be an integral part of the business," Newkirk said. "If it doesn't happen, I think the company is in deep trouble."



CLOENE GOLDSBOROUGH: *Incorporating CASE tools and techniques was "a matter of survival."*

Newkirk and Goldsborough were worried about the technology gap that existed between TWA and their longtime competitor, American Airlines. Under the leadership of CEO Robert Crandall, American has been a pioneer in the use of computers to sharpen its marketing, scheduling and fare-setting practices—efforts that have improved profitability significantly. "Crandall has a real appreciation of what information technology can mean," Goldsborough said.

Newkirk, Goldsborough and their evaluation team first decided to consider only CASE tool kits that could take them from start to finish, first helping them plan and design their system, then generating the code for it. They chose Texas Instruments'

Information Engineering Facility because of that vendor's greater stability and financial resources.

After a six-month evaluation, the team picked their first target for CASE treatment: TWA's frequent flight bonus (FFB) program. Begun in the early 1980s as simple promotional give-aways, the major airlines' frequent flier programs have since evolved dramatically. TWA's FFB, for example, was expected initially to be canceled after six months and serve 100,000 customers. Instead, it has lasted eight years thus far, and signed up more than 5 million people.

"Everybody thought it would be a flash in the night, but it became an institution," Goldsborough said.

The two things that made FFB durable were its popularity with fliers

not, for example, be adapted for special promotions without tedious hand coding, nor could it readily sort through its files to identify individuals' patterns of travel.

"The original design was inadequate," Goldsborough said. "We did not anticipate doing the kinds of things that marketing needed the system to do."

Enter CASE. Using the design and program tools, the FFB team created a new database that allows the airline's marketers to pull up-to-the-minute data on TWA's frequent fliers and to reshape their sales pitches to

More than just go through retraining, programmers had to learn new ways of looking at their jobs and of measuring success and failure.



Technical staffers (left to right)
SANDRA BEEM, LESLIE
FLAGLER and JIM JAGGERS

and its incalculable value as a source of marketing information. Using FFB records, airline marketing people can determine with great precision who was flying where at what times, yielding data that can help fill the empty airline seats, hotel rooms, rental cars and restaurant tables of those who can gain access to these records. The hitch was that TWA's ancient information technology—based on a 20-year-old IBM main-frame database system—could not go beyond the simple compilation of mileage totals for a limited number of accounts at any one time. It could

ticket buyers as quickly as competitive pressures dictate. "Under the old system, fare and mileage promotions had to be hand coded [at the operations base in Kansas City], and it would take two to six weeks to get them into the system. Now, any promotional or program changes take four to eight hours, and they can be done sitting at a terminal [in the marketing office] in New York. That's a significant difference in flexibility."

These advantages were achieved only at significant cost, however, with hidden price tags total-

ing far more than the hefty upfront expense of the CASE tool kit itself. More than just go through retraining, programmers had to learn new ways of looking at their jobs and of measuring success. And because of the steep learning curve, managers had to accept a lot of early fumbling and failure in order to end up with a well-tempered and proficient team ready to take on other CASE projects when FFB was completed.

The first battle was to win the hearts and minds of the company's most experienced programmers and analysts, many of whom were in-

clined to mistrust, or even resent, the incursion of automation into their domain. "What does it do to you—are you eliminated?" Jim Jaggers, technical manager for applications development, asked himself when he first learned of the project. "We heard a lot about CASE, and the more we found out, the more apprehensive we became."

"With CASE you are more likely to end up where you want. It isn't eliminating creativity, just channeling it to where problems are defined and solved."

—Sharon Miller

What troubled Jaggers and many of his associates was CASE's ability to write program code if given a set of general instructions, or an outline of a basic architecture. For most of their working lives, these computer pioneers had learned to measure their work by the volume of code they wrote themselves, and they grew up professionally in a culture that encouraged them to see their own blocks of code as individual works of art, with unique attributes and idiosyncrasies.

CASE, it seemed to Jaggers and his associates, would eliminate that individual imprint by shifting the programmers' focus from the code to the architecture. That change may offer highly experienced analysts more time and effort for their grand designs, but it also swept away the productivity yardsticks they had known for so long.

"It's easy to see that if you are aware of technical change, CASE is

the wave of the future," Jaggers said of his ultimate conversion to the new technology, "but in the beginning, I was very reluctant to change things I was comfortable with."

Helping staffers like Jaggers overcome their apprehension fell in large part to Newkirk. "One of our biggest challenges was in getting them to believe that change was necessary. 'Education is the key,' I said to myself. 'Here is what we have to do to alleviate their fears.'"

Many of the junior members of the CASE team at TWA did not need to be wooed as much. They saw their jobs as more technical than artistic, and CASE more a liberator from drudgery than a threat to originality.

"When I first heard about CASE," recalled Technical Systems Engineer Sandra Beem, "I thought, 'This is wonderful, I don't have to code anymore!' I never thought the primary emphasis of this job was creative."

"I like change," said Sharon Miller, an information engineering specialist on the CASE team (who left the company in February). "What I'm doing here, being a pioneer . . . that's exciting." Miller said she saw the innate power of CASE quickly, and started looking for ways to exploit it. "With CASE technology, if you follow the methods, you are a little more certain to end up at the destination you want. CASE isn't eliminating creativity, just channeling it to a higher level where problems are defined and solved."

Beem embraced CASE for similar reasons, but she also missed the reassurance she'd gotten from seeing the program code itself grow as she wrote. "What's happening under the cover of the [CASE] system?" she thought. "It's a little scary; it's an unknown. Code is a security blanket, something to hang on to."

Assembling the CASE team proved to be only the first hurdle to overcome; forging it into a viable work group proficient with the new technology was at least as problematic. "I never thought I'd say I felt burned-out at age 26," said Technical Specialist Leslie Flagler, "but we went through three project managers. It

was incredible." Most stressful for managers was not having all the answers in hand before the experiment began, which left them feeling "threatened," she said.

The project did go forward, with virtually unwavering management support. "It had to help to know that management was behind it; otherwise, employees probably would have treated it much more lightly than we did, and it would have taken much longer to implement," Jaggers said.

Also giving a boost to the team effort was the larger struggle facing the company. An old and proud name in commercial aviation, TWA had fallen on hard times during the 1980s, with financial losses, labor-relations difficulties, and a hostile takeover bid

"We had to give [employees the] license to be wrong, to make mistakes."

—Cloene Goldsborough

all contributing to a companywide feeling of malaise.

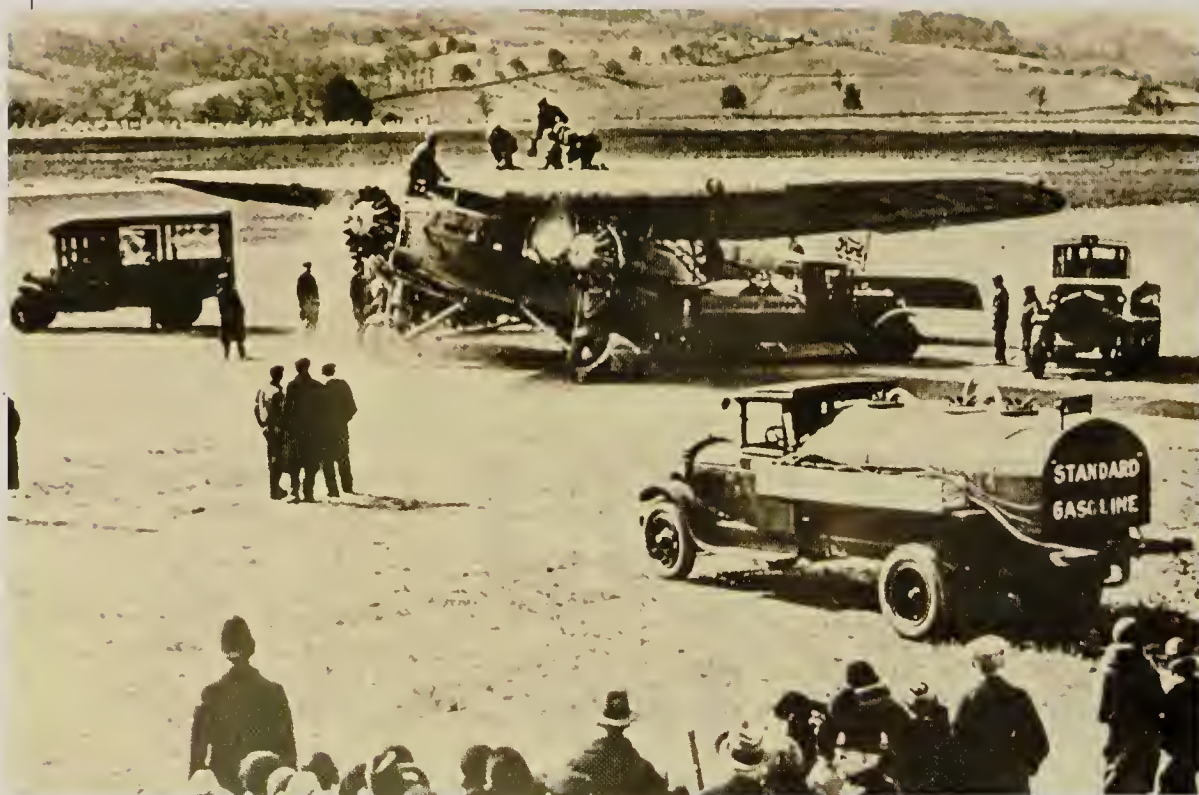
"After so many rough times, we wanted to be successful; we just weren't going to be beaten," said Goldsborough. "With that kind of determination, people move mountains." In addition, she said, the new "lean and mean" culture of corporate life puts "a great deal of pressure on employees to find ways to be successful. The price of failure is too great."

Raw pressure, however, is not enough to elicit success, Goldsborough acknowledged. "You cannot demand that people operate at that level all of the time. There has got to be some balance."

Goldsborough's complete prescription: "Take a few people [and] let

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The commercial airline business has come a long way since the early '30s when Ford's Tri-Motor plane offered the ultimate in luxury air travel.

them push all the way through on something relatively small—see something go all the way through to a production system. Nothing breeds success like success. If you spread [yourself] too thin, you could fail at everything.”

Those on the front line felt both the pressure and the beneficence.

“Top managers carried beepers so we could always get hold of whoever we needed, even on weekends,” Beem said. During one particularly difficult period in the development process there were flowers on the desks and fresh popcorn sent in for an evening snack. “I thought: ‘The guys still know I’m alive!’”

But more important than the symbolic shows of support was the clear message that, as pathfinders, the members of the CASE team should feel free to try virtually anything; that stumbling was expected and allowed for.

“We had to give them the license to be wrong, to make mistakes,” Goldsborough said.

The message came across clearly. “I always felt pretty safe to challenge my supervisors,” said Flagler, who saw that even top managers were going through a similar learning process and, consequently, “didn’t have all the answers.”



Ironically, some managers were reluctant to admit their own ignorance, even though they remained helpful and supportive of the CASE team. “Some people feel that to say ‘I don’t know’ is a weakness. They feel that they ought to know.”

Bringing CASE to TWA also required wholehearted backing at the highest executive levels, according to Newkirk. “We were probably the luckiest data processing department in the world. We had a time when we could build our budget and proceed without too much corporate interference.”

But once the checks were cut and the system in place, the real battle for acceptance began, with “tremendous resistance” from all levels of users. It wasn’t really their fault, Newkirk maintained, because the department was so low on the tech-

Once the checks were cut and the systems in place, the real battle for acceptance began with “tremendous resistance” from users.



nology curve—“somewhere between first and second generation”—that there was little faith in their ability to deliver.

User cooperation with CASE is especially important to get the clearest possible understanding of what will be required from the information system being designed. And as with some reluctant employees, the battle was won when users saw the overwhelming advantages CASE offered them. “We have now done major projects for every department, and done . . . them faster than they were done in the past,” Newkirk said.

But even those tangible results have proven insufficient for some of Newkirk’s peers and superiors at TWA, and there appears to be little he can do to change their minds. “There are some who are paralyzed by fear of change,” he said. “Their way of dealing with that is to mandate that there will not be any change.

“It’s a very effective barrier.” [C/O]

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Bricks and Mortar

Systems developers can avoid the wasted sweat of reinvention once they've recognized the generic qualities shared by all excellent systems

BY LAURENCE J. BEST

What are the features and qualities that an excellent finished system should have? This is no trivial question. Knowing what an excellent application should look like when it is completed greatly improves the chances that systems development will be successful and well received. Yet despite the obvious benefits of understanding the components of system excellence, this subject is only recently beginning to get serious attention.

A straightforward way to identify the features that best contribute to system excellence is to consider the groups that benefit from these features: enterprise management, users, systems staff and computer operations.

■ Enterprise management, aside from its general interest in the effectiveness of an application, should be specifically interested in the finished application's integration, operational flexibility and availability of management information.

■ Users are primarily interested in an application's ease of use, accuracy and comprehensiveness. Ease of use is closely related to productivity; the most productive systems are those that allow users to most easily do what needs to be done.

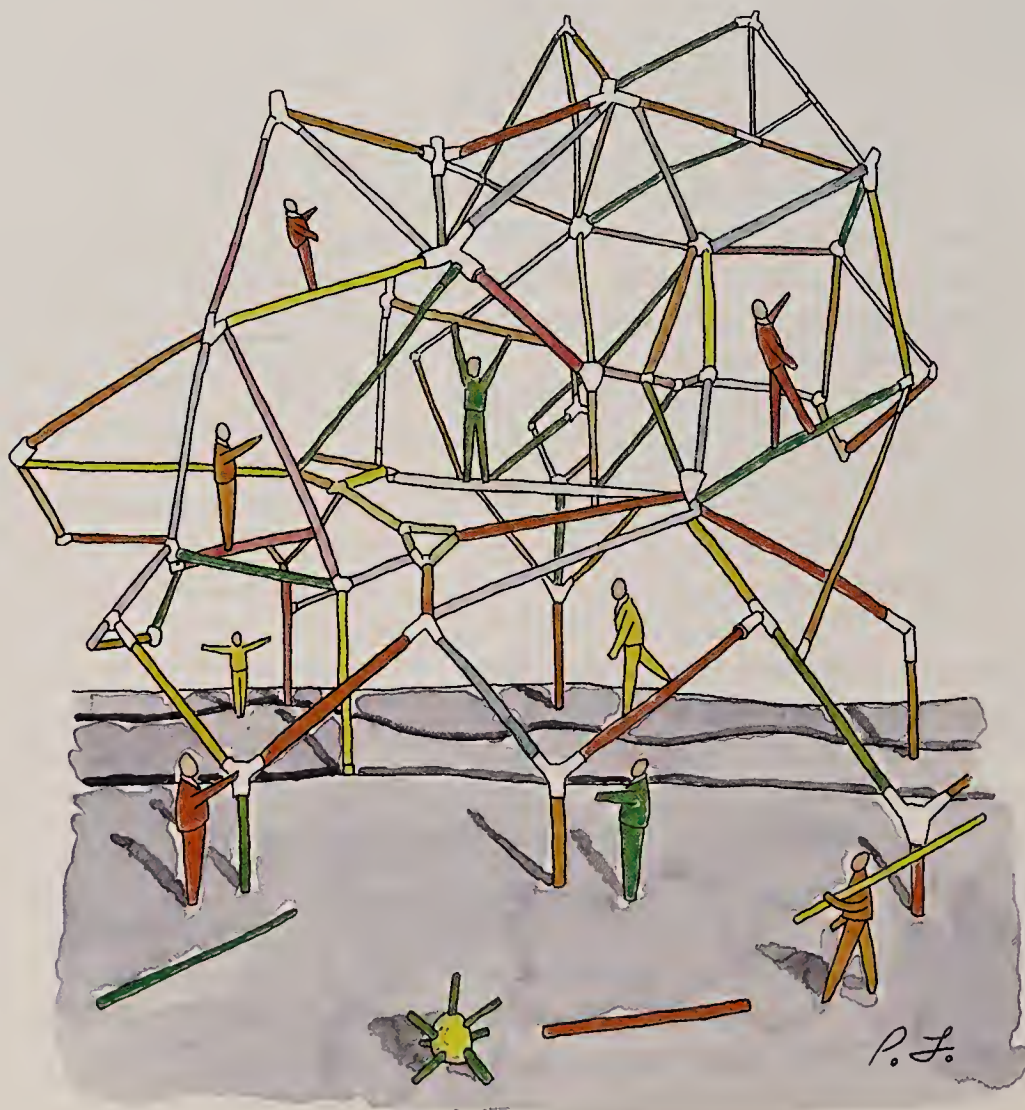
■ Systems staff are primarily interested in ease of development, maintenance and extension (making the system do more than it was originally designed to do). While tools and methodologies most often come to mind here, the application's structure should itself contribute to easy construction and modification.

■ Computer operations and support staff are most interested in security, control, resource efficiency, and recovery.

A system that has all of these features can clearly be called an excellent system.

The usual development approach is to "rediscover" and redevelop support for these features with each new system. However, a few highly successful development organizations have realized that there are recurring structures and design approaches that deliver—with much less customized analysis, design and programming—most of the features that together create excellence in the finished system.

Such a focus on the end result of systems development (rather than on development methodologies) has been called an architectural approach. Fred Viskovich, a partner at Coopers & Lybrand's Philadelphia office, has predicted that organizations will someday move into "architec-



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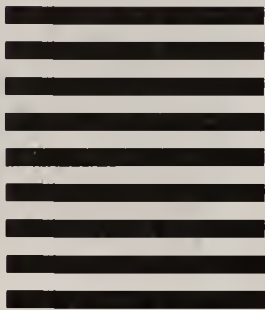
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ture-based systems development." Viskovich defines this as "building generic software specifications that also provide an application-specific business solution." Such an approach implies not only reusable code, but reusable design techniques and ideas as well.

Fred Forman and Milton Hess, executives with American Management Systems Inc. (AMS) in Arlington, Va., have written about their company's success in making key architectural design decisions even before the functional specifications have been detailed, basing these decisions on "generic requirements and design principles." In fact, most of the common features of excellent design described above can be delivered through a generic approach.

Integration, the first requirement from the management perspective, is the absence of constraints and bottlenecks in processing. Optimally integrated applications are structured around the facilities (services that support the operation of the application—for instance, the database) that are common to all large-scale information-processing applications. Structuring applications in this manner allows programs that are accessed and processed in similar ways to reside together in the overall architecture. Such systems are "borderless," a term that means they can be expanded without difficulty, coined by McCormack & Dodge Inc., of Natick, Mass., to describe its Millennium software.

The addition of new functions does not undermine the basic structure of borderless software, as it might with a system configured according to the unique characteristics of a particular application.

Operational flexibility allows routine changes to be made without programming. This can be done in one of three ways: by building in support for processing transactions either online or offline, by using online option tables to control processing, and by providing facilities for online exception data changes and overrides. Used in concert, these methods provide the greatest flexibility.

The addition of new functions does not undermine the basic structure of borderless software as it might with a system configured according to the unique characteristics of a particular application.

Being able to process a transaction either online or offline is important in the movement toward developing capabilities for electronic data interchange (EDI). Organizations with built-in support for integrated offline processing can support EDI much more quickly and easily than organizations that must develop a redundant offline processing facility. With effective architectural design, transaction logic is developed only once, even though the transaction is executed in multiple environments.

Online option tables can eliminate vast amounts of maintenance programming by allowing processing changes and new business to be assembled from parameters. According to Patrick McConnell, vice president of Global Market Central Technology for Bankers Trust Co. in New York, the company's Overseas Network Processing system owes much of its success to its extensive use of processing options.

Online support for exception data changes and overrides can allow the business operation to continue even in the face of unexpected processing or data issues. Charles W. Mead, vice president of operations software and support for GTE Data Services Inc. in Tampa, Fla., said that the ability to occasionally override the system to deal with exceptional situations permits GTE's highly automated service-dispatch system to provide higher levels of customer service. Without support for excep-

tion data changes and overrides, the old saying that "automated means you can't fix it" becomes all too true.

Finally, management requires that an application deliver the high-level information needed for corporate decisions without excessive turnaround time and custom programming. Applications can supply management information much more easily if the summary information usually needed by managers and business analysts is already available. Since the overall process of management decision-making tends to be generic, it should not really be necessary to "handcraft" the types of data needed and means of access used.

The three main aspects to excellent system design from the user perspective—ease of use, accuracy and comprehensiveness—can also be delivered through a generic approach.

Much is understood about how to make systems easy to use. Features such as menus, help functions and consistent "look and feel" have gotten considerable exposure. The spectacular success of personal computing is often attributed to the superior usability of the PC platform. Beyond these basics, several organizations have achieved success with an even more advanced online processing feature—the "electronic desk."

The electronic desk is an approach to screen design that allows online terminal operators to get all of the items of information they need together on the screen at one time. This is much more effective than traditional online screen-design approaches, which require users to jump around among many screens to complete a process. The student-loans department at Citicorp in New York built an electronic desk online inquiry system that helped make it the largest processor of student loans in the country.

Accuracy—the application's ability to deliver correct information—and comprehensiveness—how completely the application supports an organization's information processing—go hand in hand. Comprehensive applications support all processes that can

be economically automated. Patricia Wallington, CIO of Xerox Corp.'s U.S. Marketing Group in Rochester, N.Y., credits the success of the company's sales-support system to the special effort made to ensure that this very strategic system included all the features needed to empower the sales force to resolve issues as early in the sales cycle as possible.

Accuracy and comprehensiveness are the areas in which applications tend to be the most unique. They are, therefore, the areas in which structured methodologies and tools are the most important. At the same time, however, even the most unique applications have recurring patterns and approaches. Understanding these can contribute to the accuracy and comprehensiveness of the end result.

From the systems staff perspective, excellent system design means ease of development, maintenance and extension (expanding the capabilities of the original system). With an architectural approach, logic that is generic to most applications is separated from logic that is specific to a particular one. The result is that applications can be created by "plugging" site-specific modules into a standard application superstructure.

AMS has had enormous success with this approach. According to Jerrold Grochow, vice president of corporate technology, the firm has a single superstructure, called CORE Foundation Software. CORE has been used in 25 application packages supporting a wide variety of industries; these have been successfully installed at over four hundred production sites.

Excellent design from the computer operations perspective encompasses security, control and resource-management issues.

Security is best achieved through a standard commercial security package offering such basic features as password control and terminal timeouts. Some organizations supplement these basic features with advanced security facilities developed in-house. Bank of America in San Francisco has not only developed advanced security features for its wholesale operations

not found in the basic off-the-shelf security packages; it has also standardized these features across many of its applications, according to Linda Taggart, vice president/general manager of wholesale systems.

To provide control, applications should include transaction audit trails. Nestor Hernandez, vice presi-

*Applications can be
created by "plugging"
site-specific modules
into a standard
application
superstructure.*

dent of IS for Citicorp's North American Investment Banking Group, reports that the superior audit trail of Citicorp's securities trading system proved to be of critical importance during conversion from the previous system. The two systems were run in parallel, and the audit trail of the new system discovered some issues that, had they not been discovered before the conversion took place, could have created problems.

Another aspect of control involves handling sensitive data. For instance, design techniques exist to perform automatically the monetary reconciliation that regularly takes place in banks, insurance companies and brokerage firms. Anacomp Inc., an Indianapolis-based company that offers micrographic equipment for the banking industry, developed a highly effective automated-reconciliation facility for a major client that could detect and report a reconciliation error within seconds of its occurrence.

As for resource efficiency, architectural design is usually the single most important factor in application performance. Excellent performance can usually be guaranteed by structuring the major components of the

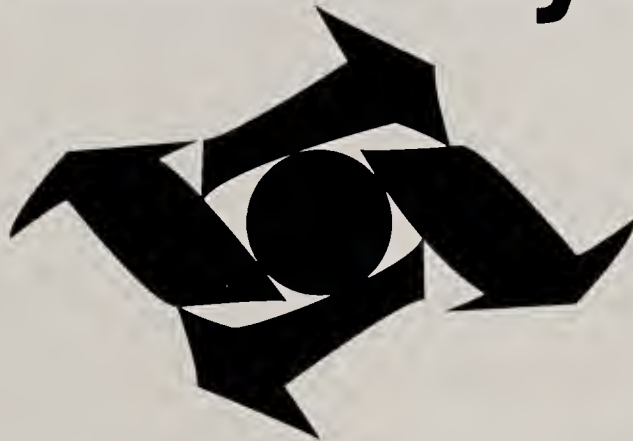
application according to the strengths and weaknesses of current access technology. Specific techniques for doing this are high-performance searching, random rather than sequential transaction processing, and load balancing (where the processing load can be shifted to off-peak times). For example, the Hogan Banking System, an integrated software package for large financial institutions offered by Hogan Systems of Dallas, incorporates load-balancing features that are an important part of its large-scale processing capabilities.

Optimal resource recovery is achieved when all processing can be restarted from the failure point without special procedures. Besides minimizing the effects of unexpected outages, effective recovery allows long-running batch jobs to be started and stopped at will, without loss of the processing time invested up to the stop point. In some systems, recoverability is a major design feature. For example, Philip J. Preston, district manager for GE Consulting Services Corp. in Pittsford, N.Y., cited one Fortune 100 manufacturer's DEC-based process-control system. The advanced recovery features of this system, he said, have proven to be essential in preventing multi-million dollar losses of sensitive materials with each outage.

Systems excellence need not be a hit-or-miss proposition. The features that make for excellence in finished systems are becoming increasingly accessible. As architectural techniques are refined, expensive and risky hand-crafting of systems will give way to construction of excellent applications from proven architectural components using established design approaches. There is much to be done, but perhaps someday our understanding of the essential components of excellence will approach the level achieved by the great classical architects of antiquity. ☐

Laurence J. Best is the author of Application Architecture: Modern Large-Scale Information Processing (Wiley, 1989) and president of Application Architecture, a Rochester, N.Y., seminar and consulting firm.

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*The Marriott Long Wharf,
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The Ledgeway Group
617 862-8500*

Service as the emerging strategic weapon of the '90s is the focus of this conference. Topics discussed include: opportunities in Europe, future trends and imperatives, and the changing nature of information systems management. Registration fee: \$895.

The James Martin World Seminar

*Sheraton Premiere,
Tysons Corner, Va.
April 23-26
Technology Transfer Institute
213 394-8305*

Topics discussed at this seminar include: developing applications fast, maximizing the benefits of new technology, and maximizing the ROI on information systems. Registration fee: \$1,995.

The Power of the Partnership

*Atlanta Hilton & Towers,
Atlanta
May 6-9
Association for Systems
Management
216 243-6900*

This conference focuses on forging strategic relationships between IS professionals and their business counterparts. There are also sessions covering such topics as systems development, project management, and contingency planning. Registration fees: \$625 for members; \$725 for nonmembers.

Portable Computing & Communications

*Anaheim Convention Center,
Anaheim, Calif.
May 9 & 10
IDG Conference Management
Group
508 820-8258*

Sessions on portable connectivity, disaster recovery, trends in the '90s, portable computing as an information resource. There is also an exhibit of portable technology products. Registration fees: exhibit, \$20; conference, \$195.

The Monterey Software Conference

*Doubletree Hotel, Monterey, Calif.
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Digital Consulting Inc.
508 470-3880*

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Hammer Forum '90

*The Marriott Long Wharf, Boston
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Hammer and Company Inc.
617 354-5555*

The focus of this conference is "The Transformation of Customer Service: Information Technology and the Customer-Centered Organization." Speakers from Xerox, American Express, Fidelity Investments, GE and others discuss techniques for implementing service capability. Registration fee: \$1,250.

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CONFERENCE CALL

QUESTION: *Are high-profile projects the best way to win IS supporters?*

High-profile/high-return IS projects are a popular way for IS executives to garner support from their bosses and clients. But is it appropriate for such projects to be driven by political agendas—especially where there is a risk of failure? Where do CIOs draw the line between politics and responsible use of IS resources?

Judy Shapiro

Director of Strategic Information Technology at McNeil Pharmaceutical in Spring House, Pa.

“We do go after high-profile projects. I think that they are very important.

“When we say high profile, what we mean is high impact for the company, both in terms of the bottom line and the strategic direction. That’s different from people going after a pet project. Politics is always present in allocating scarce IS resources. But politics and bottom-line business factors don’t have to be mutually exclusive reasons for choosing a project. I think the role we’re trying to take in our IS department is to work closely with clients to identify high-profile projects. I like to think that IS can play a special role in this pro-

cess because of our ability to view activities across departments and divisions. The trick is to be involved as a business partner on an ongoing basis and not just as the recipient of someone else’s project ideas. That way, you have a chance to influence which projects get funded, so that the ones that are strategically important as well as politically correct rise to the top.

“Obviously, the effect of doing the right high-profile projects is that you get a lot of good recognition and support and have a much better relationship with clients. We have a much better opportunity to get people’s time, to get information and to sell our ideas if we’ve been able to win their confidence.”

Henry Paulsen

Director of IS for Dresser Industries Inc. in Dallas

“I certainly participate in projects that I consider high profile. Usually, the purpose of the project is to achieve some good for some Dresser operating unit. But I do not use high-profile projects as a means for selling some IS-related agenda to the executive man-

agement in the corporation. My definition of a high-profile project is one that will leverage technology in a powerful fashion to achieve something very quickly—either enhanced service or profitability. It becomes high profile after the fact.

“I’m not averse to the politics that surround the information technology role in Dresser. It’s just that I feel it’s unfair to use hype as part of the political process. I think it’s much more adult to use success rather than hype.

“That approach protects us in a sense. If you raise a project to a high-profile level at the outset, there’s always the potential that you will attract a lot of helpers who will, in fact, slow down the evolution of the project. I’d rather maintain a skunkworks operation and succeed than have a high-profile project fail.”

Jerry Uyeda

Vice President of Information and Technology Systems for Airborne Express Corp. in Seattle

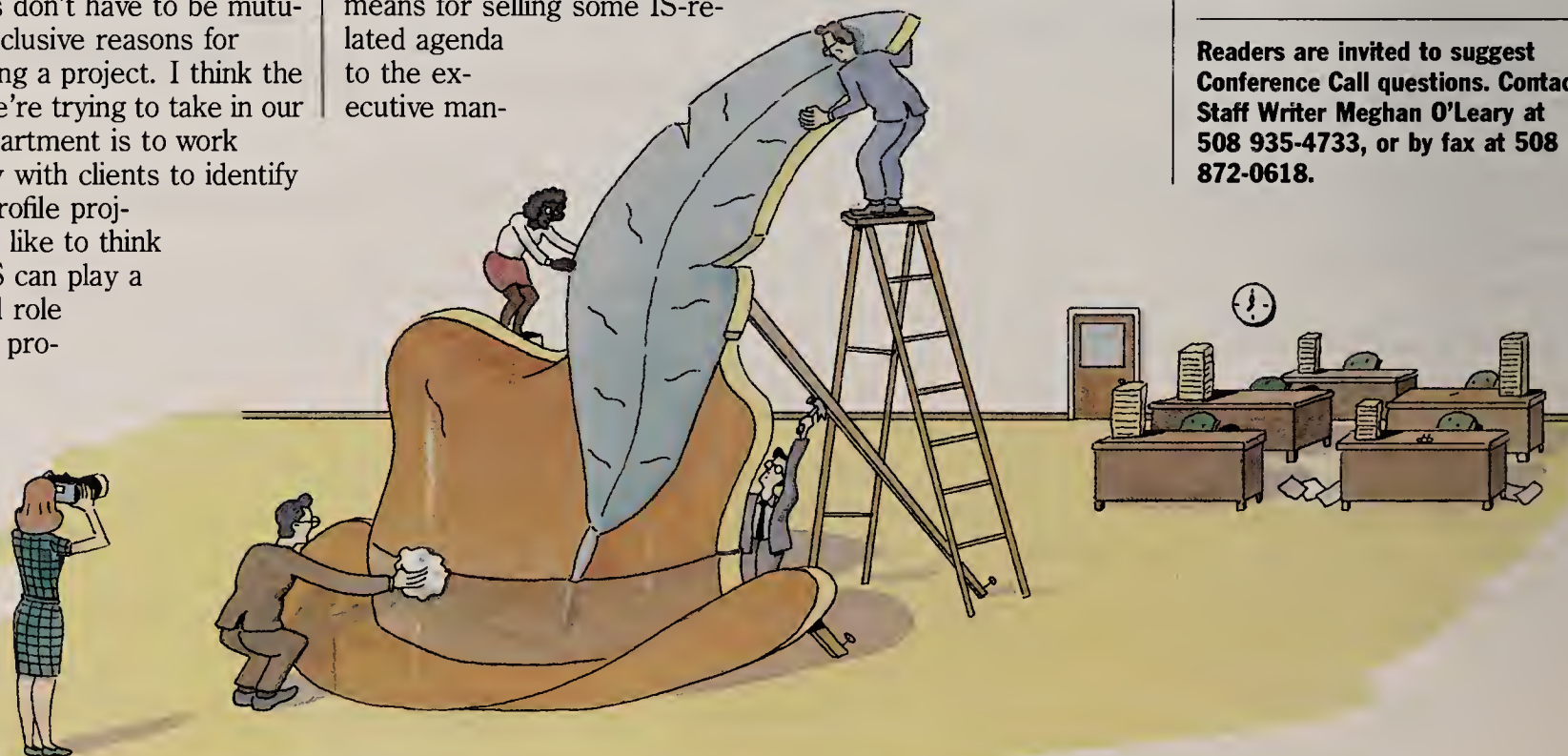
“Winning support is sort of a chicken-and-egg situation. But I would never get into a project just to make IS look better. The primary motiva-

tion for doing projects and getting them funded here is a business requirement. I think in most IS organizations, there’s an extreme backlog of projects. And I’m sure most IS organizations rank their projects in terms of their benefit to the company.

“I think that the climate in my company is that the executives already have an awareness of IS as a strategic tool. I don’t think we have to build our credibility with high-profile projects. We already have credibility. We have had a number of successful [lower-profile] projects that continue to reinforce that. We’ve had projects that make a difference to the company in terms of savings or competitive advantage.

“Another way of looking at the issue is high tech versus low tech. That relationship gets back to the very pragmatic nature of our executives. We’re in a very competitive industry. We’ve always taken the view that being a low-cost provider is essential to remaining competitive. A high-profile EIS, for example, would not be a project that our executive group would want to embrace or support. Even if I thought that, politically, it would help the IS group, they just wouldn’t buy it.”

Readers are invited to suggest Conference Call questions. Contact Staff Writer Meghan O’Leary at 508 935-4733, or by fax at 508 872-0618.



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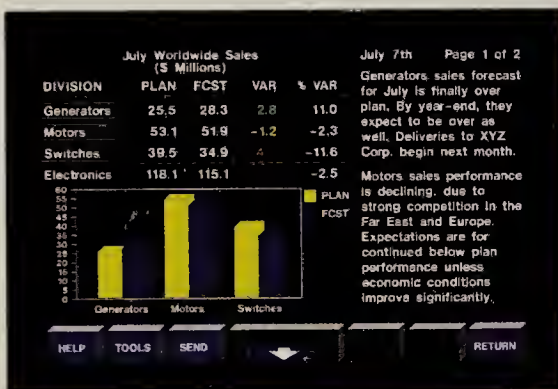
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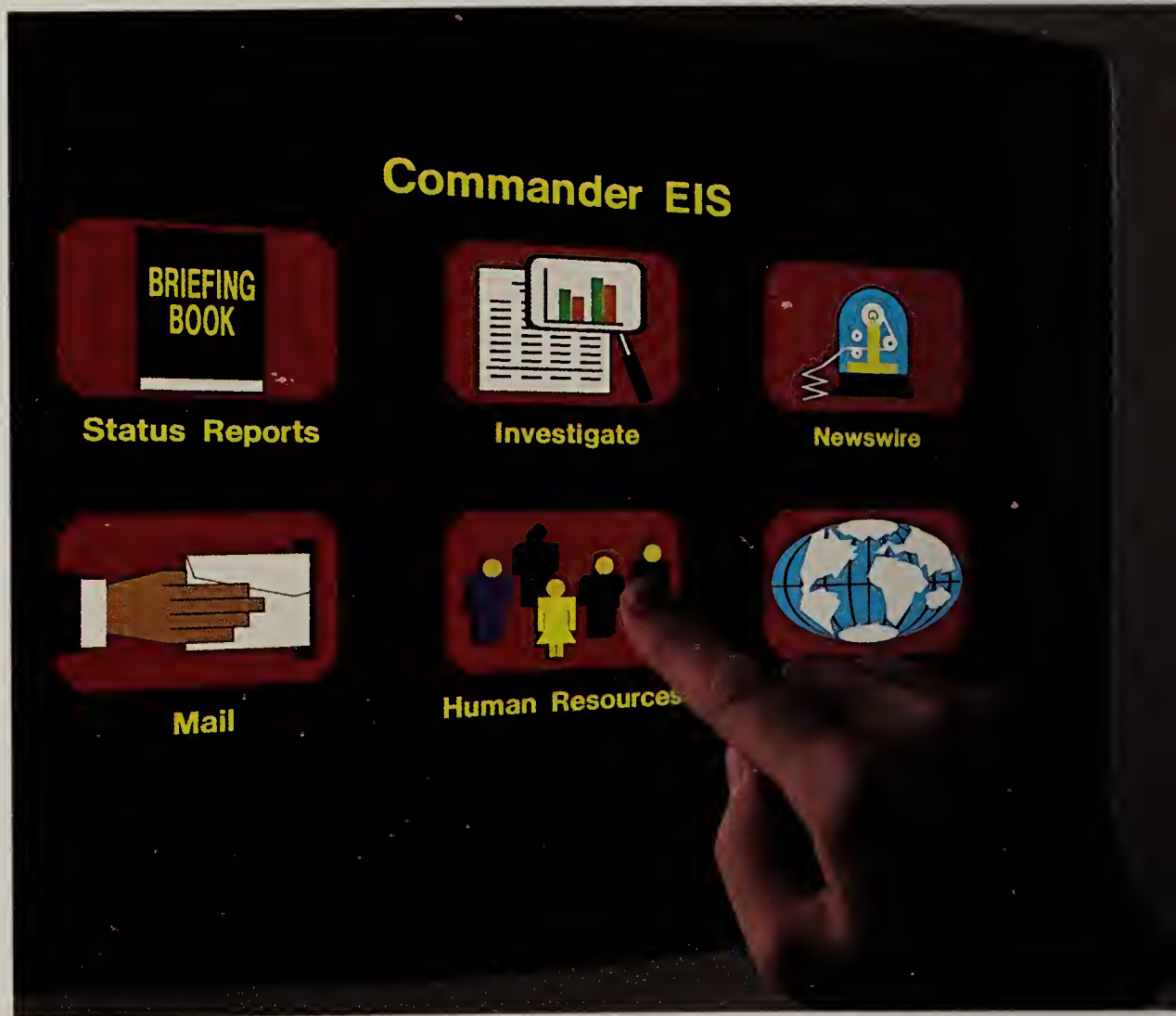


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